SELF-REPORT MEASUREMENT OF SEGMENTATION, MIMESIS AND PERCEIVED EMOTIONS IN ACOUSMATIC ELECTROACOUSTIC MUSIC

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Tiivistelmä– Abstract

Acousmatic Electroacoustic Music is a form of art in which any sound is regarded to have the potential to be used as a basic unit to build a musical discourse. This study addresses the measurement of three important aspects of perception of Acousmatic Electroacoustic Music: Segmentation, which is the separation of the audio stream into units that could have meaning by themselves or that could be part of larger meaningful structures; Mimesis, which in this context is defined as the perceptual ability of identifying a possible and meaningful source that produced a sound and the action that produced it; Perception of Emotions, which shapes the meaning of perceived events. This document reports the development and adaptation of tools and techniques to perform self-report measurements of these three aspects and the use of them in perceptual experiments with human participants. The results of these experiments suggest that participants' strategies to segment sounds can correspond both to their acoustic features and to their meaning inferred by source and action. Participants' identification of sound source and action can greatly vary and narrative responses suggest that sounds trigger meaning rather than having meaning by themselves. Post-hoc and continuous measurements of perceived emotions were remarkably similar, suggesting that perceived emotions in discrete sounds are established constructs that might not change considerably when acting in context. Finally, it is shown that continuous measurement of Segmentation and Perceived Emotions is reliable only for sounds with a duration over 4 seconds, which leaves an open window for further investigation on the measurement of perception of shorter sonic events.

Asiasanat – Keywords
acousmatic, electroacoustic, music, measurement, segmentation, mimesis, perception, emotions

Säilytyspaikka – Depository

Muita tietoja – Additional information

CONTENTS

1 INTRODUCTION

The study that has been carried out and presented in this document has focused on the measurement of three aspects of perception of Acousmatic Electroacoustic Music that have been deemed crucial according to a survey of the literature about music psychology, sound perception and aesthetics of electroacoustic music. One important motivation to study this kind of music is that as of today it seems to be no consensus between the scientific community and the composers of electroacoustic and in general contemporary music in academia and musicologists, on generalized perceptual strategies for making sense of acousmatic electroacoustic music and thus to explain from an objective point of view the workings of the aesthetic experience of listening to this form of art. Perhaps the most established way of approaching the analysis of electroacoustic music is by first segmenting the piece into smaller parts, until reaching the smallest meaningful unit which has been called "sound-object". From this basic unit more complex structures can be perceived and therefore meaning arises, chiefly by the identification of the nature of the sound and then by the perception of its possible qualities linked to emotional affect. Electroacoustic music is composed of sounds often manipulated in ways that the result evoke experiences that transcend the earthly experience thus provoking analog reactions in listeners. Therefore, the study of it from a scientific perspective does not only aid to understand the aesthetic experience but also it could reveal aspects of human perception in ways that it might not be possible or easy with other kind of stimuli. Self-report measurement has been chosen as the strategy to measure the mentioned three aspects, because it needs a conscious introspection by the listener and therefore provides access to high level psychological mechanisms taking place in perception.

The first aspect to be measured, Segmentation, has been proposed to be one important step to identify and therefore to make sense of what is being heard, not only in music but in general auditory perception. Then the measurement of Mimesis considers that making sense of what is being heard is mainly related to the perceived source of the sound and the action that produced the sound. Finally, the measurement of Perceived Emotions explores the idea that emotional content of perceived stimulus is highly influential in the meaning of what is being heard. The results of these three measurements can be compared and observed as a whole in the quest of possible relationships amongst them. To carry out these measurements this study has comprised the elaboration of tools and techniques. Some tools used are novel while some other are adaptations of techniques previously used in research such as ecologic acoustics, music perception and psychoacoustics. These techniques and tools have been developed for the specific study of acousmatic electroacustic stimuli and have been tested in the present investigation by using them in perceptual experiments with human participants. The results of the experiments have proved they have a high level of reliability, while also being simple to use. They experiments also allowed to reveal limitations of these tools and techniques.

Following this introduction a Theoretical Background is provided, which includes an introduction to Acousmatic Electroacoustic Music and issues found in literature about its analysis and perception. This chapter also contains sections devoted to the definition, contextualisation in the perception of acousmatic electroacoustic music and measurement techniques of Segmentation, Mimesis and Perception of Emotions. Following the Theoretical Background the major part of this document presents the methods used, which include the developed tools and their usage in data collection and analysis of the mentioned three aspects of interest. Results of the experiments are discussed in light of their pertinence to the aspect being measured and possible research questions. The final chapter discusses the strengths and weaknesses of the presented measurement Tools and Techniques, also suggesting directions for future research.

2 THEORETICAL BACKGROUND

2.1 Acousmatic Electroacoustic Music

In the history of human cultures, Electroacoustic Music is a recent and quite particular musical genre. Perhaps due to its novelty it has not yet been fully assimilated by popular cultures and less academic studies have been conducted so far compared to more traditional genres. It has indeed received attention of artists and scholars who have so far written mostly theoretical works that are mainly prescriptive rather than descriptive of this form of art. Still, few studies have been conducted on the perception of this kind of music, from a psychological point of view and using scientific methods.

It is possible to highlight two main definitions for Electroacoustic Music, which are found in the specialized literature. The first one defines any musical form using any kind of sound source that finally emanates from one or more loudspeakers. Thus, it considers any music that is recorded and then reproduced over an electroacoustic system. Landy (1999) has defined eleactroacoustic music as any music in which electricity has had some involvement in sound registration and/or production other than that of simple microphone recording or amplification and Truax (1999) has added that it involves manipulation of sounds with an artistic purpose. In this document, a definition will be used which attempts to synthesize most of the literature available on the subject until the date this text was finished: Electroacoustic Music is produced by the manipulation of sound taking full advantage of electroacoustic technology. The means to produce the music expand the possibilities compared to the ones available prior to the electroacoustic era, making possible a new aesthetic, one that goes beyond the use of pitch and rhythm as the main acoustic features for building a musical discourse.

The term "Acousmatic" refers to the sound whose source is visually hidden from the listener. The word itself was used by the Greek wise man Pythagoras when referring to his lecturing behind a curtain in an attempt to separate himself from his discourse. Hence, Acousmatic Electroacoustic Music is the one that while projected through acoustic projecting devices (such as loudspeakers or headphones) does not visually reveal the source of the sounds being projected. The most typical case is music that has been fixed in some recording medium and then played back by a loudspeaker system. Jérôme Peignot and Pierre Schaeffer (Schaeffer, 1966; Schaeffer,1967) published for first time the use of the word *acousmatique* to specify the listening of *musique concrète*, which is regarded as the origin of electroacoustic music in the European academic music tradition. Schaeffer went even further and made a classification of sounds which required a special kind of listening, an *acousmatic* listening, in which not only the visual component of the source of a sound has been intentionally removed but also the source itself. Later, this kind of listening was named *reduced listening* (Chion, 1983). This kind of aural perception requires a sort of agreement from the listener, which can be understood as a *listening contract* (Chaves & Rebelo, 2012), an analogous idea to Chion's *Audiovisual Contract* (Chion, 1994) in which the spectator agrees to fall into the illusion generated by the audiovisual work. Schaeffer's work is based in a phenomenological approach to the analysis of electroacoustic music, the first of its kind. His treatise's principal component is the segmentation of the musical stream in meaningful units, which were called *sound objects*, also proposing a classification of them according to their perceived acoustic similarities. This theory was based on the experiences of Schaeffer and a reduced crew of associates. In the same line a more recent work, *Les Unités Sémiotiques Temporelles* (Delalande et al., 1996), also called UST, has achieved a stronger connection with perception because the research team performed extended listening tests to formulate the classification of sounds with semantic meaning, also regarding them as the smallest units to build music, not only of the electroacoustic genre. Smalley (1986, 1997) also proposes a classification of sounds, but unlike the previous examples, he also includes the spatial component, which is most important in the case of electroacoustic music because the possibilities of its medium allow the use of space as one more means for the elaboration of musical structures.

While the methods of analysis described in the preceding paragraph have been successfully used as a tool for Electroacoustic Music composition and analysis, they cannot provide by themselves a good model of human perception because they regard sounds out of context and they require that the analyst performs the reduced listening that consciously takes in account only the spectral content of the sound without taking in account the possible source of it. This is not the normal situation of listening and requires to abide to the listening contract, demanding a certain knowledge to interpret the stimuli in the way it might fit into the analysis criteria. It could be said that these theories tell how the perception should be made, they are prescriptive rather than descriptive (Windsor, 1995) and the results of such analyses can be ambiguous, depending on the experience of the listeners as well as the context of presentation.

Nevertheless some experimental studies have been conducted with the purpose of demonstrating the cognitive pertinence of these theories. Cádiz and Lipscomb (2004) performed an experiment where experts and non-experts in electroacoustic music were asked to group short electronically generated sounds. They reported that the participants performed a classification very close to the sound shapes classification in Smalley's spectromorphology theory. In the same fashion Frey et al. (2009) reported that participants in an experiment could consistently group short sounds compared to the classification of the UST. Probably the greatest achievement of these theories and the empirical studies that support them has been to establish a starting point for a perceptual study of electroacoustic music, based in the identification of the smallest meaningful units upon where more complex associations can be made. If small segments of sounds can provide semantic meaning, it would be not absurd to hypothesize that they might also be able to convey emotional content. Indeed Bradley (2000) reported that individual sounds can affect emotionally, after performing an experiment measuring perceived emotions in naturally occurring sounds.

While the previously mentioned studies can be regarded as important steps towards an understanding of Electroacoustic Music, they cannot be regarded by themselves to be the only nor the principal means for building a model of perception. An attempt to build such a model shall not end in phenomenological prescriptive accounts or in basic units isolated from context. Subjective affects is one of the components that build the context for perception of music. Juslin and Laukka (2004) demonstrated that perceived emotion in music is strongly related to most people's primary motives for listening to music. Other influences of perception might be not subjective but more generic to humankind as for example the human voice and naturalistic sounds, as shown in a study on Trevor Wishart's music that extensively use these kind of sounds (Brattico & Sassanelli, 2000). A few more studies have been conducted on the perception of electronically manipulated and generated sounds (see Bailes & Dean 2007, 2009, 2011, 2012; Dean & Bailes 2011a, 2011b) that will be discussed in following sections of this text.

In general it can be hypothesized that every distinct sound and the way it evolves through time and interacts with other sounds, might have particular ways to influence perception. As Electroacoustic Music takes advantage of the musical potential in any kind of sound, from the unreal to the ones found in everyday life, likewise its perception and cognition can act in the way as in dreams or as in the normal everyday hearing, opposed to the specific modes of hearing proposed by Schaeffer or Smalley.

Other theoretical approaches have gone far beyond the acoustical features of sound and source recognition. Kendall proposes a cognitive analysis observing cognition over time based in a schema considering a diverse range of cognitive events (Kendall, 2008, 2010). He suggested the existence of a strong link between the phenomenological analysis and embodied cognition. A similar idea was identified by Smalley as morphological archetypes, which can be understood as patterns of *temporal shaping* which are extensions of human action, and therefore can be considered musical gestures which are embedded in the audio content. Then the endeavour of explaining perception of electroacoustic music, of music and of sound in general does not end at the limits of the human mind considered as an autonomous entity. According to the view of embodied cognition the human body is part of the perceiving mind (Varela, 1993) and links between the segmentation described by Schaeffer, Smalley or Delalande et al. could be found in observations from an embodied cognition viewpoint. Timsit-Berthier (2007) proposed a reclassification of the UST with a phenomenological approach based in what she called *biosemiotics*, which still needs to be tested experimentally. The classification of sounds, as intuitively proposed by the foremost authors, might have a direct link to the motorics of the human body, as Godøy (2006) argues that in perception and cognition there is a *motormimetic* component. The role of culture also plays a role in the complex matrix of perception. Bent (1987, 1994) states that *"Information in musical context has been defined as the non-confirmation of expectation"* This statement can be seen as a cognitive process of reward based in learning, thus drawing from high-level associations of listeners' personal experiences. Thus, before information can be interpreted there must be some expectation. Tiits (2002) discusses extensively the role of culture and learning in the perception of electroacoustic music. He asserts that *"When a student learns about music, she learns about tradition"*. Hence, it seems appropriate to consider that the combination of the basic semantic units that make musical structure are conveyors of meaning —including emotions— and that meaning might also be shaped by information coming from the human body and its interactions with the environment.

2.2 Segmentation

Human beings can extract information and make sense of what they hear, mainly by the segmentation and grouping of auditory streams. This process enables a listener to identify the different sources of what is being heard (Bregman, 1994) and it applies to listening in general, included what we call music. In particular, segmentation can be defined as the act of dividing an auditory stream into sections. The strategies for establishing the boundaries of auditory segments might be broad and operating in different levels. Low-level auditory features based in spectral content such as pitch, duration, loudness, timbre and location indicate a first reference for the segmentation process. Mid-level features such as grouping sounds into streams, harmonic and rhythmic structures provide more complex relationships which finally can be interpreted as high-level constructs with an associated meaning (Cook, 2001).

Considerable amount of research has been conducted on segmentation related to the perception of structure in so-called *classical music* and there is an established corpus approaching this genre from different perspectives (Imberty, 1993; Deliège, Mélen, Stammers, & Cross, 1996; Krumhansl, 1996; Deliège, 2001; Lalitte et al., 2004). However, little is known about non-tonal western and non-western contemporary music (McAdams, Vines, Vieillard, Smith, & Reynolds, 2004). Nevertheless, study of perception of contemporary music from a cognitive point of view and using the scientific method has caught some attention. Bailes and Dean are amongst the few scholars that have published investigation of contemporary art music and especially of electroacoustic music, using scientific methods. Based on their investigations they have claimed that perception of structure in music is first and foremost concerned with the perception of change rather than continuity, not only in non-tonal music. Also they have stated that segmentation is mainly related to the *surface features* of music (Bailes & Dean, 2007; Bailes & Dean, 2012). Likewise, Deliège et al. remarked that evidence in Western classical music suggests that the most powerful cue for segmentation is texture. Additionally, Imberty has proposed that the macrostructure of a musical piece is comprised by perception of significant changes. Bailes and Dean also added that one drawback of the investigation of music segmentation is that the task often requires multiple hearings of the audio stimulus, which might not correspond to the naturalistic experience of listening to music. These arguments are in line with the phenomenological approaches of sound-object-based analysis discussed in the previous section, chiefly with the notion of reduced listening. While these approaches might give a starting point to think of segmentation comprised of the basic units called sound-objects, when those are put together and act in context a different cognitive schema might be operating. In this sense, Smalley (2007) argued that segmentation might not be possible in many acousmatic works because their musical discourse is built upon sounds that merge and change rather than upon clearly identifiable boundaries.

Empricial research on segmentation has been carried out mainly by means of self-reported measurements of perception. The traditional musicological approach has been a phenomenological description based on theoretical principles. Another approach may be called "theory-blind" which is closer to everyday listening in the sense of being naive to prescriptions of listening, in which non-experts are asked to declare where they perceive a change in the music. The typical approach would ask participants to listen to a musical piece and press a button at the start of a musical idea (see Krumhansl, 1996) or at "landmark" points, (see Deliège et al., 1996). This approach is close to the natural experience of music but has the problem of inaccuracy due to the psycho-motoric mechanisms involved in the response. Another approach has been to allow participants to fine-tune their responses in repeated listenings aided by the placing of visual cues on a timeline (de Nooijer, Wiering, Volk, & Tabachneck-Schijf, 2008). The above described works have focused mainly on *traditional western* musical structures such as melodic phrases or major sections (e.g. verse-chorus). Some of these perceptual experiments have had the main purpose of observing participants' strategies for segmentation and therefore infer the underlying psychological mechanisms. Another proportion of these studies have been designed to compare participants responses to the results of a computed segmentation algorithm using audio feature extraction.

2.3 Mimesis

Mimesis has been defined as a concept at the intersection of imitation and representation. Some of the earliest examples of the concept are found in classical literature. Plato used the term mainly to refer to the representation of nature. Famous is his account of Socrate's metaphor of the three beds, appearing in *The Republic* (Plato, 1945). One bed exists as an idea made by god (the Platonic ideal), the second is made by the carpenter in imitation of god's idea and the third one is made by the artist in imitation of the carpenter's. Hence, Plato claimed that the artist's representation has been removed from reality twice. Thus he gave more importance to philosophy than to art for philosophy is concerned about ideas, whereas poetry is concerned about the representation of things that have been twice removed from reality. Because of this Plato rejected poetry as it is mimetic in nature, morally and philosophically. On the other hand, his colleague Aristotle advocated poetry for its mimetic nature. He said that poetry is an imitation of an action and its nature is neither philosophical nor moral. He looked at poetry as a piece of art and not as a means of conveying truth. The concept has evolved since then. Gebauer (1995) has pointed that mimesis involves the identification of one person with another, that includes both an active and cognitive component, that has an indicative character and that has a performative aspect associated with its physical aspect as a representation of what has been indicated. Mimesis, as representation and imitation is also used by disciplines not in the humanities or social sciences. In biology, mimesis is defined as the phenomena between camouflage and mimicry, like for example some animals or plants that resemble other plants or animals for the ultimate purpose of survival (Pasteur, 1982). Other disciplines as mathematics and linguistics have also used the term mimesis to designate some kind of representation by means of imitation.

In auditory perception mimesis takes place at the attempt to identify sound sources. The identification of the source of sounds, whether they have or not a match in the real world, is the first step to make sense of what is being heard. Early empirical research on description of sounds was conducted by VanDerbeer (1980), in which listeners were presented with recorded examples of everyday sounds and they were asked to write a short phrase describing each sound. In this experiment listeners tended to describe sounds in terms of the objects or events that caused them and that only when they could not identify the sound they described it in terms of its acoustic characteristics. In a similar investigation conducted by Gaver (1998) listeners paid more attention to the acoustic qualities of sounds when the source was unknown or ambiguous than when it was known. One thought that arose to explore mimetic relationships in music perception was the distinction of two kinds of listening: "musical listening" and "everyday listening". It has been proposed that these operate at the same time and that the listener makes use of either depending on individual factors such as mood or needs (Gaver, 1993). In this context "musical listening" has been proposed as the attention to acoustic features of sounds rather than a possible practical meaning, while "everyday listening" is pragmatic.

In an investigation conducted by Giordano and McAdams (2006) participants very accurately indicated physical properties of the source of sounds they were presented with, such as material and size. This was explained to occur because the materials in question are part of everyday experience. Francès and Dowling (1988) reported results of experiments in which participants were asked to listen to extracts of music and to attribute a title to the piece they heard. Analysis of semantic responses found evidence for correlation of attributes of sound and extramusical concepts. Francès suggests that reference to a particular musical style, genre, or instrumental source brings with it the cultural-historical context of that style. Upon the idea of musical listening Baily (1996) has added that it is a culturally specific listening aesthetic, where the cognition of music involves consolidated meanings by associations and functions acquired by their historical usage. Further discussion of this has been made by Clarke (1999) and Windsor (1995, 2000), who argue that sounds directly specify cultural meanings. Along the same line Dibben (2001) stated that emprical evidence suggests that listeners hear sounds (both musically and everyday) in terms of their sources and cultural specifications rather than exclusively in terms of their acoustic characteristics. Dibben challenges Gaver's view of everyday and musical listening by extending the notion of source specification to the specification of cultural and compositional categories, and she also argues that listening to music involves listening to what sounds specify just as much as it involves listening to the acoustic characteristics of them. In empirical investigations Dibben asked listeners to group sounds indicating the reasons for doing so. She found that listeners based the majority of their judgments on the acoustic resemblance of sounds,(as found by the previously mentioned studies of grouping sound-objects by Cádiz and Lipscomb, 2005; Frey et. al, 2009. Also Dibben found that each sound could represent a range of different meanings. Thus, it appears that listeners are sensitive to both the acoustic characteristics and specifications of sounds such as the source of the sound, cultural links or more subjective aesthetic classes, all of which is affected by listeners' individual traits and experience.

Conforming to the notions of mimesis explained by Gebauer, the concept has been also discussed in terms of embodied processes. Cox (2001) discusses mimesis in terms of representation and imitation by means of bodily action, a kind of physical empathy that involves imagining sounds we listen to. However, Cox states that *"Many or most musical sounds are evidence of the human motor actions that produce them and that electronic and electronically reproduced sounds are special but compatible cases"* (Cox, 2001). Here mimesis appears as a combined process of indication and representation. These ideas are also in line with the ones observing a link between embodied cognition and perception of electroacoustic music by Thimsit-Berthier and Godøy discussed in the previous section.

In the arena of aesthetics of electroacoustic music, Emmerson (1986) defined "mimetic discourse" as that which imitates nature (i.e. the physical world) or aspects of human culture not usually associated with musical material. The counterpart is what he defined as "aural discourse", which is focused on the acoustic features of sounds as musical materials. Upon these categories, he described "abstract syntax" as the way sounds are put together in which the organisation does not depend on neither mimetic or aural properties of the sounds as materials. On the other side there is the "abstracted syntax" in which the organisation of sounds do depend on aural or mimetic properties within the sounds. These categories are then combined into a "language grid" that can be used to analyse works as having a particular discourse/syntax dominant types. However, he quickly warned that regarding these categories, the ones intended by the composer and the ones perceived by the listener might not be the same. In the case of aural and mimetic discourses, he also points that they are wholly independent categories and defines the aural-mimetic continuum. This view is consistent with the findings by Vanderbeer, Biley, Gaver and Dibben described previously in the contexts of tonal music and ecological acoustics. Windsor

(2000), commented that acousmatic listening might intensify the search for what has caused the sounds to exist. He added that the search is personal and it is not constrained by a strict semiotic mapping. Thus, he claims, perception is *active*. This idea is in line with Gebauer's explanations. Therefore neither composers or listeners are in full control of what will actually be perceived. Windsor added that when sounds are presented acousmatically

> "we are both drawn to and freed from literal perception and where such tension is exploited by the musician an aesthetic begins to emerge which plays with our relationship with the real work. Whether a real or virtual stage is heard will depend on the context but we cannot expect the listener to ditch millions of years of perceptual development in the face of a tantalizing curtain between sound source and perceiver".

Windsor's comment briefly describe a possible paradigm in the search of explanations of the aesthetic experience of acousmatic electroacoustic. Another comment, by Fischman (2007), completes the idea:

> "It is often true that *an image is worth a thousand words.* But perhaps, one may dare to add that *sounds can be worth a thousand images.*"

2.4 Perception of Emotions

Perception of emotions in music is a high level cognitive process whereas the feeling of emotions is a lower level one (Juslin & Vastfjall, 2008; Juslin, Liljeström, Västfjäll & Lundqvist, 2010; Juslin, 2013). The first involves a complex relation of knowledge, mood and personality and the latter involves physiological response. In perception of musical emotions it has been shown that personality traits have and influence (Vuoskoski & Eerola, 2009, 2011a, 2011b). In induction of emotions, musical structure can cause *"physical reactions as shivers down the spine, laughter, tears and lump in the throat*, when *there is confirmations and violations of expectancy* (Sloboda, 1991). This is an indication of the potential of music to be used to regulate mood. A typical example would be the music played in department stores or supermarkets to regulate the shopping pace of the customers, making them feel the need to buy. Another example is the use of music in advertising, inducing a mood compatible with the marketing strategy.

Listeners consciously use music for different emotional purposes (Juslin, 2004) like mood regulation, concentration in studies, masking undesirable sounds in the environment, dance, exercise, etcetera. Västfjäll (2012), showed how sounds without perceived meaning can induce distinct emotional reactions. It would be not absurd to think that the other way round, emotions perceived in sounds that do have a meaning, whichever it might be, is more complicated to investigate, because this relationship depends hugely on personal traits such as knowledge, personality or mood, that at the same time depend on other variables such as culture, environment, motormimetic relationships and so on. Moreover, the mechanisms to measure the perception require some introspection of the listener. It is necessary to stress the distinction between induced or felt emotions and perceived or evoked emotions by means of auditory or musical stimulation.

To understand emotions evoked by music, they can be measured and classified (Zentner, Grandjean, & Scherer, 2008). However, the literature has shown that a preferred point of departure for this kind of research is taking sounds isolated from context, as it has been shown that this way sounds can convey emotional affect (Bergman, Vastfjall, Fransson, & Skold, 2008; Bergman, Sköld, Västfjäll, & Fransson, 2009). Further empirical research has produced a catalogue of sounds which has proved to be effective in conveying emotional meaning (Bradley & Lang, 2007) and yielding a characteristic relationship of mean responses in the Valence - Arousal emotional space (Eerola & Vuoskoski, 2011; Posner, Russell & Peterson, 2005).

While some studies have used post-hoc questionnaires to assess short stimuli (Bergman et al., 2009; Bradley & Lang , 2007), some ingenious systems have been developed to assess continuous affect responses in the Valence - Arousal space (Schubert, 1999; Schubert, 2001). The "Real Time Cognitive Response Recording" system (Schubert, 2004) and "Emujoy" (Nagel, Kopiez, Grewe & Altenmüller, 2007) are software pieces that have a visual interface in which the participant being tested rates the perceived emotion on the two-dimension emotional space when listening to a stimulus. However, self-report data might not be as accurate as desired and more or less processing to the data has to be done before it starts to make real sense for a researcher. While this fact can be one of the major challenges for an analysis, it can be counter-acted by means of finding coarse events correlations rather than making an attempt to observe fine-grained relations (Upham, 2011).

It might also be possible to make a model of perceptual responses to music without considering a phenomenological musical analysis but in relation to specific measurements of spectral content. Studies by Bailes and Dean are amongst the few of this type respect to Electroacoustic Music. They have reported results of acoustical measures consistently matching arousal (Dean & Bailes, 2011), however their results have not proven to be effective for a model of emotional Valence (Bailes & Dean, 2012).Other studies have been conducted on the perception of affect in computer-generated sounds out of context (Bailes

& Dean, 2009) in which familiar sounds have been rated with higher positive valence than unfamiliar sounds. Also computer-manipulated sung sounds have been found to convey more arousal when they are perceived closer to human singing (Bailes & Dean, 2011). Nevertheless isolated sounds, while being the building blocks of what is understood as music, are not normally understood as proper music. Sounds put together make musical structure which is closely related to emotional response (Sloboda, 1991), therefore context should be acknowledged as an important variable of the emotions perceived from sounds.

3 METHODS

3.1 Overview

This chapter reports in detail the tools and techniques investigated to measure self-reported Segmentation, Mimesis and Perceived of Emotions in Acousmatic Electroacoustic Music, as well as experiments that put them in practice. Firstly, the experimental apparatus is described, presenting an original piece of software that has been developed to automate data collection, making it easy for the researcher to design and test the experimental procedures, perform the data collection and organise the recorded data among other advantages that will be discussed. Also the software allows to standardize the procedure, decreasing the chances of biasing by means of the researcher's interaction with the participant. For example, the software can perform the exact same procedure for all participants in an experiment without the need of the researcher to give instructions. The source code of this software is provided in the Appendices section. Another tool presented is a similarity measure that has been developed specifically to evaluate the similarity of music segmentation sequences. This measure was implemented as a function in the Matlab programming environment and the source code is also provided in the Appendices section. Also extensive software has been written in Matlab to perform computations of data analysis but their code is not included in this thesis. Only the tools specifically developed for this project are described extensively and for other tools a reference to their documentation is provided.

Next, a brief report is presented of each of four experiments performed to put in practice the developed tools and to further refine the measurements of the three dimensions to investigate. The first experiment used an excerpt of an Acousmatic Electroacoustic Music piece and was focused on the segmentation of human participants and its comparison to a computed method based on audio features. Also this first experiment explored the strategies of participants to perform the segmentation task. The data recording of the following experiments was done in one recording session for each participant. These experiments, instead of using a proper electroacoustic music piece, used stimuli specifically composed to simplify the tasks and thus to focus the measurements. A collection of sounds were used either concatenated or discretely. Experiment 2 used the concatenated sounds as one single stimulus and the aim was to compare participants' segmentation and computed segmentation using the data analysis technique previously used Experiment 1. The concatenated sounds, in contrast to the acousmatic piece excerpt used in Experiment 1, provided both a single audio layer and objective boundary points to compare to participants' and computed segmentation. The semantic analysis used in Experiment 1 to assess participants' strategies to perform segmentation was further refined and used to a greater extent in Experiment 3 but to analyse a different phenomena. Experiment 3 focuses in exploring Mimesis by measuring participants' agreement of their identification of source and action specifications of a stimuli collection. Experiment 4 was designed to compare measurements of Perceived Emotions in two contexts: post-hoc measurement of discrete sounds and continuous measurement of the same sounds concatenated in a single stimulus. The perceived emotions measured in this experiment were "Valence" and "Activity". The definition of "Valence" used in this study can be summarized as "an emotional quality of the sound which can be in the range of positive to negative". "Activity" was used as a simplification of other definitions used in previous investigations such as "Arousal" or "Activation" (Zentner & Eerola, 2010). Activity, as used in this study, can be defined as "an emotional quality of the sound which can be in the range of not active to very active". A brief discussion is provided to close each experiment report.

3.2 Experimental Apparatus

During the execution of the investigation reported in this document it was necessary to make several measurements. For that purpose a system was designed to present stimuli and record data with the ability to be programmable for different experiments. The system is comprised of input, capture, playback and data storage devices. One input device used was a Nintendo Wii Remote Controller (also referred to as Wiimote), capable to transmit data of buttons via Bluetooth radio waves protocol to a personal computer nearby. A microphone can be used as input device for verbal responses and the computer keyboard can be used as a free-entry text or as a "hot-key" input device with specific behaviour for preset keys. The system's auditory output for presentation of audio stimuli or instructions is the computer's audio device, which can be connected to loudspeakers or headphones. The visual output is the computer visual display. The core of the system is a piece of software programmed in the Pure Data environment (Puckette, 1996) that has a very simple visual interface for the researcher to perform the recordings in an organized way. It was named "Visuaural" because of its capabilities. It can play back audio files in sequential or randomized order, display text, display a counter, record continuous and discrete data from Wii remote buttons, record continuous data from Wii Remote accelerometer, perform a Stroop test and display questionnaires with images and inputs such as Likert scales, nominal and free text entries. Also it has some features aimed to perform automated experimental procedures, such as writing files reporting the order of the randomized display and naming the recorded data files in a way that is easy to organise them and to open in other software for analysis such as Matlab or Excel. All the functions provided by Visuaural can be combined and adapted to perform an experimental procedure, which has to be written in a regular text file and is called a "program". The full source code of Visuaural is provided in Appendix A and the list of commands and syntax to build a Visuaural program can be consulted in Appendix B. Visuaural runs in the Puredata Extended software package ("Pure Data", 2014) and it requires another software capable of translating the raw Wii Remote signal to an Open Sound Control (OSC) data stream (Wright, 2005). In this project the software used to do such task was Darwiin Remote ("DarwiinRemote", 2014).

The researcher's interface, as it can be seen in Figure 1 is simple to use. It consists of six steps thought of as the procedure of a data recording session. In the first step the researcher enters the current date. The second step opens a configuration window to check the audio input and output levels if necessary, check or change the OSC port that will receive the Wii Remote data, check or change the continuous data capture rate, check the "pitch" (horizontal angular movement) of the Wii Remote, check the preset keys and load the Visuaural program that contains the procedure. At step three it is necessary to input the participant number. Step four will set the system ready only if the date and the number of participant have been entered. Being the system ready the loaded Visuaural program will start when either the Wii Remote "A" button or the computer's alphanumeric keyboard spacebar is depressed. In the same section of step 5 there are five windows with a black background. The topmost window indicates the number of the current step of the program and the function. For example if it is playing back an audio file it will display the name of that file. Below there is a window that will display the continuous data as it is recorded. The small window at the bottom left will display a value in non-continuous measurement, for example when other Wii Remote buttons or keyboard keys are depressed. The small window at the bottom center will flash a yellow dot exclusively when the Wii Remote button "A" or the keyboard's spacebar are depressed. These two are always linked and can be used indistinctly. The small window to the bottom right will display the time elapsed when the "wait" command has been called. Finally, when the Visuaural program is finished, it can be set to automatically return to step three, to begin the procedure with another participant, or to standby. In the latter case, the researcher will have to click the button at step six to return to step three for the recording of the next participant.

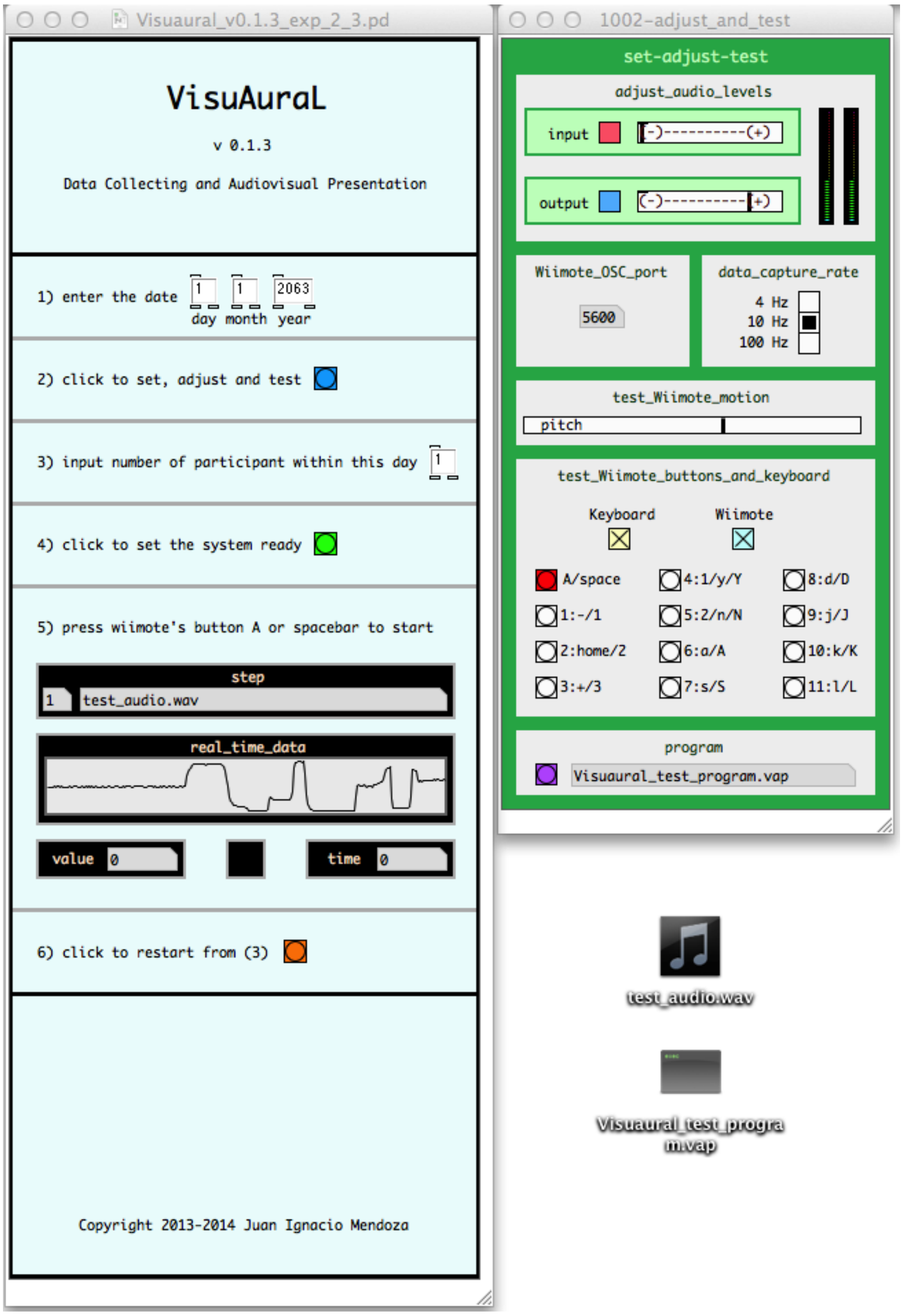


FIGURE 1. Visuaural's researcher visual interface. To the left the main window. At the right top the configuration window and at the right bottom an audio file icon and a Visuaural program icon.

Visuaural was used in all the experiments described in this document and developed along the process of the design and execution of the subsequent experiments. An early release of Visuaural was used in Experiment 1, called "Aural" because it was not able to display visual information to the participant. Later, for Experiments 2, 3 and 4, the questionnaire modules were added, along with other features. At some point of this project it was thought that it would be convenient to add an experiment involving a Stroop test, therefore this capability was also added to Visuaural. At a later design stage of these experiments the Stroop test was discarded but the Stroop module in Visuaural remained. Visuaural's questionnaires modules were programmed used *dynamic patching*, which is an advanced technique that generates code given initial parameters. In this way, for example, it is possible to produce questionnaires as needed, without a fixed format.

It is worth to mention that the main motivations to write this software in the Pure Data environment are that by doing so the software is portable and free. Pure Data is actively maintained for Macintosh, Windows and Linux operating systems. Visuaural's patch, documentation and associated abstractions have been published under the GNU free software license version 3 (Free Software Foundation, 2007) in the hope that it will help researchers and students that are not able or do not want to develop or purchase software, or that are just interested in the workings of Visuaural.

3.3 Segmentation Sequences Similarity

To date, most music segmentation studies comparing results from human participants or computation, have focused on musical styles that are subject to a musicological analysis that provides reference segmentation boundaries. These boundaries are often identifiable in some kind of representation such as a musical score. This has been used as a solid base line to assess their similarity to perceptual measurements of segmentation. These studies include popular music styles 4based in rhythm and pitch, which are regarded as the most important factors of music segmentation (Krumhansl, 2000). Previous studies on comparison of boundary points sequences have performed somehow similar procedures. Melucci and Orio (2002) in measuring results of computer versus human melody segmentation performed distance measures of sequences produced by pairs of humans. In that study distances of boundary points in the sequences were represented by a symmetric matrix and then the distance for the sequences was extracted. Cluster Analysis and Multidimensional Scaling to measure participants' agreement was applied to use the resulting sequence as a baseline. This was then compared to computed boundary points sequences to assess an algorithms' performance. In a more recent study conducted by de Nooijer et al. (2008) the boundary points given by human participants were first approximated to the nearest note. This note was linked to an amount of participants. An algorithm being evaluated produced boundary points sequences of which each point was assigned to the closest single note and its magnitude was paired to the amount of participants at that point. The two paired sequences were normalized and then a Wilcoxon signed rank test was performed on them. These two methods used mainly musical stimuli with clear melodic and rhythmic content. These are two examples of ways to compare segmentation sequences that, according to the published reports, seem to work very well when the stimuli concerned is music whose structure depends on melodic and rhythmic features. However they will not be useful to compare segmentation boundaries of a style in which no single analysis or representation like a score can be made, which is the case of electroacoustic music. In addition, both described methods require symmetry, which might not be possible when assessing sequences produced by human participants or algorithms because they can contain different amounts of segmentation points for a given audio stimulus. Hence, another method is needed.

A segmentation sequence can be represented as a binary sequence, where each digit represents a point sampled at equal time intervals. One digit (i.e. a zero) will appear by default, while the other digit (i.e. a one) will appear at a boundary point. Therefore what is needed to satisfy the requirements mentioned in the previous paragraph might be found in binary distance and similarity measures. The list of binary sequences distance and similarity is not reduced (Dauwels et al, 2009; Choi et al, 2010) and these measurements are applied on areas such as DNA sequences, neuron spike trains and data mining, among others. It seems appropriate to consider these measurements for the comparison of segmentation sequences. However, each measurement method has its own peculiarities, advantages and limitations. Some methods assume probabilistic distributions or need the input of initialization parameters, adding complexity to the problem. A preliminary assessment of binary sequences similarity and distance measures revealed that none was able to completely handle the task of assessing similarity of segmentation sequences in a simple way, when it is not assumed that they have equal amount of boundary points.

An algorithm was devised specifically to assess similarity between two segmentation sequences. It requires that both have the same length of sampled points at the same sample rate. This is the case in which, for example, two segmentation sequences for the same audio file are compared. Both sequences and the audio file have the same length in the units that the sequences have been sampled. Then the indexes of the boundary points (i.e. the ones) form new vectors. These could be of the same size or not and will be used to assess the sequences distance and similarity. In fact the indexes vectors alone are required to perform the computations and these can be obtained in different ways, not necessarily going through a process of representation of binary data. A detailed description is provided hereinbelow.

a and b are vectors containing indexes of binary data. In this case an index is a number which indicates the place of a one in a sequence of zeroes and ones. L is the length of the binary vectors. $L_a = L_b$. N is the amount of indexes, which is the same as the amount of elements in either vector a or b and $N_a \geq N_b$.

For example, a binary data vector $X = \{0,0,0,1,0,0,0,1,0,0\}$ whose length is $L_x = 10$ has an associated index vector $x = \{4,8\}$ that has an amount of elements $N_x = 2$.

The algorithm is made up of measures Distance, Closeness and Fraction of Paired Elements. The procedure to carry out the computations is as follows:

Distance

Generate a distance matrix M_{jk} of index vectors a and b:

$$M_{jk} = |a_j - b_k|$$

Find the minimum values of each row and column:

$$m_r(j) = \operatorname*{argmin}_{k \in [1,n]} M_{jk}$$

$$m_c(k) = \operatorname*{argmin}_{j \in [1,n]} M_{jk}$$

From their intersection compute the mean:

$$I = \left[\bigcup_{j \in [1,n]} \left(\bigcup_{k \in m_r(j)} (j,k) \right) \right] \cap \left[\bigcup_{k \in [1,n]} \left(\bigcup_{j \in m_c(k)} (j,k) \right) \right]$$

$$d(a,b) = \frac{1}{|I|} \cdot \sum_{(j,k) \in I} M_{jk}$$

The values of a and b corresponding to the intersection minima values become vectors a' and b'. Hence the values in a' and b' are the closest paired elements from a and b.

Below an example of a distance matrix for index vectors $a = \{5, 8, 12, 80, 91, 94\}$ and $b = \{6, 10, 85, 97\}$, where $N_a = 6$ and $N_b = 4$:

$$M_{jk} = \begin{bmatrix} |a_1 - b_1| & |a_1 - b_2| & |a_1 - b_3| & |a_1 - b_4| \\ |a_2 - b_1| & |a_2 - b_2| & |a_2 - b_3| & |a_2 - b_4| \\ |a_3 - b_1| & |a_3 - b_2| & |a_3 - b_3| & |a_3 - b_4| \\ |a_4 - b_1| & |a_4 - b_2| & |a_4 - b_3| & |a_4 - b_4| \\ |a_5 - b_1| & |a_5 - b_2| & |a_5 - b_3| & |a_5 - b_4| \\ |a_6 - b_1| & |a_6 - b_2| & |a_6 - b_3| & |a_6 - b_4| \end{bmatrix} = \begin{bmatrix} 1 & 5 & 80 & 92 \\ 2 & 2 & 77 & 89 \\ 6 & 2 & 73 & 85 \\ 74 & 70 & 5 & 17 \\ 85 & 81 & 6 & 6 \\ 88 & 84 & 9 & 3 \end{bmatrix}$$

$m_{r(j)} = \{1, 2, 2, 2, 5, 6, 6, 3\}$
$m_{c(k)} = \{1, 2, 2, 5, 3\}$
$I = \{1, 2, 2, 5, 3\}$
$N_I = 5$
$d(a, b) = \frac{1+2+2+5+3}{5}$
$d(a, b) = 2.6$

Hence, $a' = \{5, 8, 12, 80, 94\}$ and $b' = \{6, 10, 10, 85, 97\}$

<u>**Closeness**</u>

$$c(a, b) = e^{\left(-\tan\left(\frac{d(a,b) \cdot 90}{L}\right)\right)}$$

tan is calculated in degrees.

The closeness formula is exponential and returns a value between 0 and 1 when its exponent is negative. The greater is the absolute value of the exponent, the smaller the output will be and vice versa. The exponent is composed by a tangent function with a factor of 90 degrees in its argument, which will return a value between minus infinite and zero. Thus, the closer the distance, the smaller the output of the tangent will be. Since it is divided by L, the argument of the tangent is a ratio. This is convenient to compare different measurements of binary vectors having the same length L, which is the case for the comparisons of segmentation sequences. Also the output value between 0 and 1 is convenient for interpretation, since it can be regarded as normalized. The formula also adapts well to the nature of the data, as it gives less weight to distance values that approach the whole length of the original binary vectors (L), considering that the segmentation sequences to be compared would not have such great distances.

Fraction of paired elements

$$f(a,b) = \frac{N^*}{N_a}$$

N^* is the least amount of unique elements in vector a' or b'.

The fraction of paired elements penalizes the points not close enough to be paired. In the previously given example $a' = \{5, 8, 12, 80, 94\}$ and $b' = \{6, 10, 10, 85, 97\}$, therefore $N^* = 4$ and $f(a,b) = \frac{4}{6}$

Similarity

$$S(a,b) = c \cdot f$$

S is a value between 0 and 1. The algorithm will find the closest elements between vectors a and b. If there are equidistant points then both will be paired (see Figure 2). It will match the closest points and therefore it will not handle lags shorter than the minimum distance found. To evaluate lags, this algorithm could be used in combination with a procedure evaluating similarity at different delay times. Nevertheless, the closeness measure is sensitive to the length of the sequences, which makes it useful to compare several sequences with different amounts of points for the same binary data length. The algorithm was implemented as a function in the Matlab programming environment and the source code is provided in Appendix C.

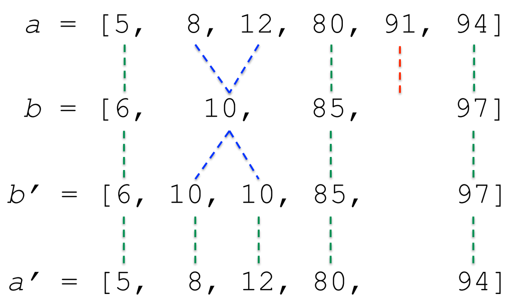


FIGURE 2. Pairing of example sequences a and b. Note that equidistant elements produce duplicates.

3.4 Experiment 1: Segmentation of an Acousmatic Music Excerpt

3.4.1 Aims

The aim of this experiment was to explore participants' performance in a segmentation task of an Acousmatic Electroacoustic Music excerpt. Participants indicated perceived *changes in the music* in five listening trials. The data analysis involved a comparison between participants' segmentation data and segmentation data obtained from computation. It was hypothesized that the responses of the latest trials would be more accurate than the first trials, compared to the computed segmentation. A related hypothesis was that the latest pairs of trials (trials 4 and 5) would be more similar among them than the first pairs (trials 1 and 2), which would suggest that ratings consolidate with repeated listening. Also the strategies that participants used to perform the task were observed by means of a semantic analysis, to infer the relevant acoustical or musical features related to the perceived segmentation boundaries.

3.4.2 Participants

Twenty-two participants took part in this experiment, with ages ranging from 20 to 40 years (median was 26 years). Out of them it was possible to distinguish two kinds of participants. 81.8% were music students or lecturers at the University of Jyväskylä, including those in the Music Psychology training programmes. 18.2% were undergraduate or degree students from other areas at the same university. Participation was voluntary and a chocolate was offered as reward.

3.4.3 Stimuli

Two short excerpts were presented to the participants. One of them was 38 seconds (from approximately 1'17" to 1'55") of the electroacoustic piece "Ciguri" (Otondo, 2008) by the contemporary Chilean composer Felipe Otondo. It was chosen because it is made up of sounds which are organised not necessarily as occurring in real everyday life, the pitch relationships within are not necessarily based on tonal functionality or scale structures and because of unfamiliarity. Only one participant (4,5%) declared familiarity with the piece, although from the information gathered in the interview after the data recording, it seems the participant made a mistake when providing this information. 14 participants (63,6%) declared to be unfamiliar with the music style.

The other stimulus was used as a control, to assess the participants' ability to successfully segment music of a different kind. It comprises the first eight bars of the widely known "Minuet in G major" by baroque German composer Christian Petzold [1] in an orchestral interpretation where only woodwinds play. It was chosen because it was thought that since this piece musical discourse is based on functional tonal pitch relationships and divisive metric, it should be fairly familiar to most participants. The familiarity with the style and the piece itself shall be directly proportional to participants' understanding of the musical structures and therefore the segmentation should be in line with a musicological analysis of melodic motives and phrases in a functional tonal context. 20 participants (90,9%) declared familiarity with the piece and all (100%) declared familiarity with the music style. However, this text will not report the segmentation ratings to this stimulus for it is outside the scope of the study.

3.4.4 Procedure

Participants were given a very brief explanation on the use of the Wii Remote controller, then they were left alone in the room and were asked to go out and tell the researcher in charge when the automated procedure had finished. The main task of the participant was to press a button when perceiving a change in the music while listening to it. Each stimulus was played back five times. Prior to the main tasks they also performed a training, in which they listened to the first 17 seconds of Aerosmith's "Walk This Way" (Tyler, S., Perry, J, 1975) two times, without the segmentation data being captured.

The two stimuli were presented in different order for each half of the participants, considering there would be the same amount of each kind (music faculty/students and students of other areas) as described in the preceding section. The automated procedure took each participant between 15 and 20 minutes, depending on the number of repetitions of the first instructions and training. The complete procedure is provided in Appendix D.

Then, the researcher interviewed each participant for about 5 minutes. In this interview the participants were asked their age, occupation and any comments they wanted to share. The information given at this stage was used as complementary to the verbal responses recorded within the described procedure. The interviews were not recorded in audio. Instead the researcher in charge took written notes.

[1] "Minuet in G major" was widely known to be Johann Sebastian Bach's work because it appears in the "Notebook for Anna Magdalena Bach", a manuscript he wrote for her second wife. Nevertheless, it has been argued that this piece was composed by Christian Petzold. (Schulze, 1979)

3.4.5 Data Analysis

The raw data showed considerable variation of the participants' amount of boundary points per listening, ranging from no points in all trials to 16 points in one trial, for different participants (mean = 3.9 points; SD = 3.2). Kernel Density Estimation (Silverman, 1986; Horová & Zelinka, 2007) was used to produce a segmentation points sequence that could represent the whole group of participants. The peaks of this function indicate the boundary points at different levels of resolution set by the kernel width (KDE) and a threshold line (pk) which is set at different densities to pick peaks equal to or over the line. A greater amount of points appear as lower is the peak threshold and narrower is the kernel window (see Figure 3). Several sequences were produced with different kernel widths.

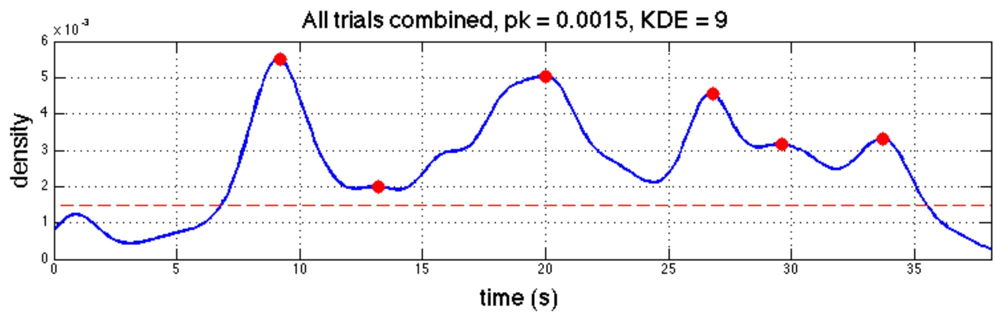


FIGURE 3. Kernel Density Estimation curve. The segmented red line indicates the peak threshold and the red dots indicate selected peaks which designate segmentation points.

Each of the produced sequences was compared to computed segmentation sequences of the stimulus audio file. The computed segmentation was obtained by using the *Novelty Selection Function* of Self-Similarity decomposition (Foote & Cooper, 2003) applied to the audio wave spectrum. This method has been successfully used before in electroacoustic music (Klien, Grill & Flexer, 2012). Apart from the mentioned work there is not much literature on segmentation of musical styles other than those based in rhythm and pitch. The computation was done using the implementations available in the *MIR Toolbox* (Lartillot & Toiviainen, 2007) package for the Matlab environment. The procedure first decomposes the signal in frames of 0.05 seconds with no overlap and then performs a Fast Fourier Transform upon each frame using a Hamming window resulting in a spectrum of the whole signal. Then the Novelty function is applied to the spectrum using cosine distance and exponential similarity. A curve is obtained and then the peaks of that curve are extracted to finally get a segmentation sequence comprised of the points in time where the algorithm has segmented the audio file.

A comparison of each pair of human and computed sequences was performed using the similarity measure described in the previous Section 3.3, at different kernel window sizes for Density Estimation (KDE) and also different peak thresholds (pk) in the case of human participants' data. Also different kernel sizes were evaluated for the Novelty Function (NK) in the case of computed audio spectrum. The unit presented here for the KDE values is samples where each sample has a length of 0.1 seconds and the unit for the NK values is frames, where each frame has a length of 0.05 seconds. The parameters used are shown in Table 1.

TABLE 1. Parameters for Similarity Comparison

Human Participants segmentation	
KDE window range	1 - 10
KDE window iteration step size	1
Peak threshold (KDE density) range	0.0005 - 0.005
Peak threshold iteration step size (KDE density)	0.0005
Computed segmentation	
Novelty kernel size range	64 - 640
Novelty kernel size iteration step size	64

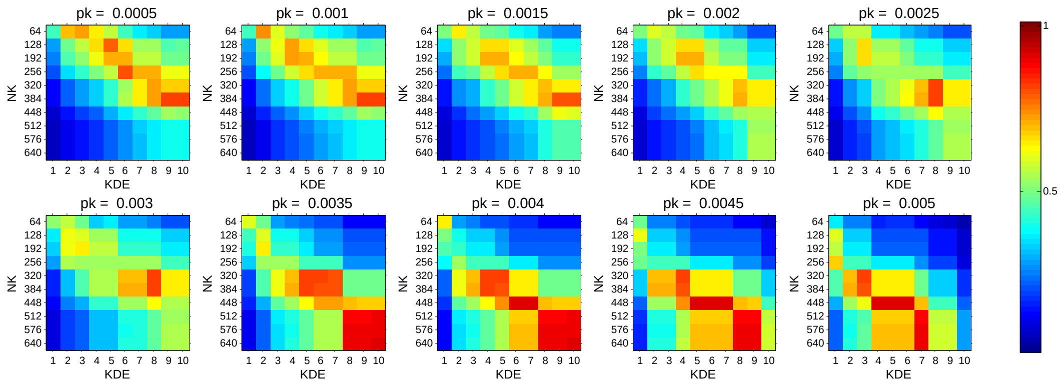
The comparison procedure was performed upon two sets of segmentation points. The first one contained all the participants and all the trials sequences combined. The second one comprised only the last trial, under the hypothesis that accuracy might improve in subsequent trials, being the last trial the most representative. The comparisons of similarity values were arranged in matrices visualized as heat maps (see Figure 4). Also similarity between pairs of trials was measured (see Table 3) to observe a possible increase of similarity towards the latest pair of trials (trials 4 and 5), which would reveal a progressive consolidation of participants' ratings.

Participants' answers to the question *"How could you tell when there was a change in the music?"* were manually grouped in semantic clusters. Each cluster is defined by a signifier which is a word or a short sentence describing a concept. Each signifier corresponds to 2 or more occurrences of the same word or concept within the sub-groups. One sub-group is comprised by participants who are music students or teachers and the other sub-group comprises other people. Cases that did not fit in any of the clusters were isolated (see Figure 5).

3.4.6 Results

The heat maps in Figure 4 show that distinctly high values of similarity between participants' and computed segmentation sequences arise at different density levels, on both trials groups (all trials and only last trial). This suggests that some participants might have indicated boundaries at a more fine-grained level than others. To get a segmentation sequence representing all the participants it is reasonable to choose a relatively high peak threshold, that accounts for a high density of segmentation points. The maximum peak threshold evaluated was pk = 0.005 because at a higher pk value values no points were produced at some KDE values. The comparisons for all trials and last trials show an intersection of local maxima at pk = 0.0045, KDE = 7 and NK = 448. The nearest highest intersection occurs at pk = 0.0015, KDE = 9 and NK = 384. These intersections indicate the highest consistency of all the trials compared to the last trial. Table 2 shows the participants' segmentation sequences produced at different densities.

All participants, all trials:



All participants, last trial:

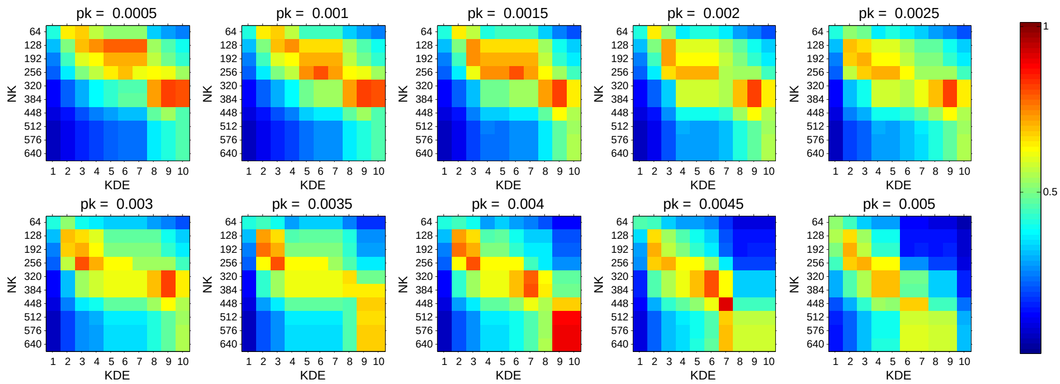


FIGURE 4. Heat maps of Similarity matrices. Each panel contains matrices with participants' density peak threshold (pk) from 0.0005 to 0.005. KDE values (human participants) are shown in the horizontal axis and NK values (computed) lie in the vertical axis. Colours closer to dark red represent more similarity and colours closer to dark blue represent less similarity.

TABLE 2. Participants' segmentation sequences at different levels of resolution. KDE and segmentation points are expressed in seconds.

pk	**KDE**	**NK**	**trials**	**segmentation points**
0.0045	7	448	All trials	9.2 18.6 20.3 26.8
			Last trial	9.1 18.6 20.2 29.1
			Computed	4.5 15.9 22.4 27.8
0.0015	9	384	All trials	9.2 13.2 20.0 26.8 29.6 33.7
			Last trial	9.0 16.2 19.9 26.5 29.5 33.8
			Computed	4.5 9.0 15.9 22.4 27.8 33.4

TABLE 3. Similarity of pairs of trials

pk	**KDE**	***S* between trials**				$\overline{x}_S$	**SD**
		1-2	**2-3**	**3-4**	**4-5**		
0.0045	7	0.75	0.74	0.99	0.97	0.86	0.14
0.0015	9	0.83	0.71	0.65	0.82	0.75	0.09

The comparison of similarity between subsequent trials returned a slightly increasing tendency at pk = 0.0045 and KDE = 7 but no consistent increase was observed at pk = 0.0015 and KDE = 9. Nevertheless, average similarities were deemed to be substantially high as it can be seen in Table 3 . To properly assess similarity it should be considered that S is an exponential function of a tangent function that would return $S = 0.72$ when the distance of the segmentation sequences $d(a, b)$ is 20% of the total amount of sampled points L and all elements of a and b are paired without equidistant duplicates.

Figure 5 shows the clustering of participants' segmentation strategies. The table shows some responses which indicate inability to answer (31,8%), but a significant amount gave descriptions that could be summarized with a central descriptor, which was the appearance of a new sound. Also, a second cluster was found describing evolution of sounds, which was summarized with the phrase (as said by some participants) *"something that goes and comes"*. At the interview stage participants commented on their strategies of segmentation and added information, which was taken into account to make the aforementioned categorization. Some participants commented about the difficulty of making sense of the task. Still, most participants expressed they felt comfortable and even some declared they enjoyed it, which might be a good indication that there was not any auditory fatigue and therefore that the data has considerable reliability.

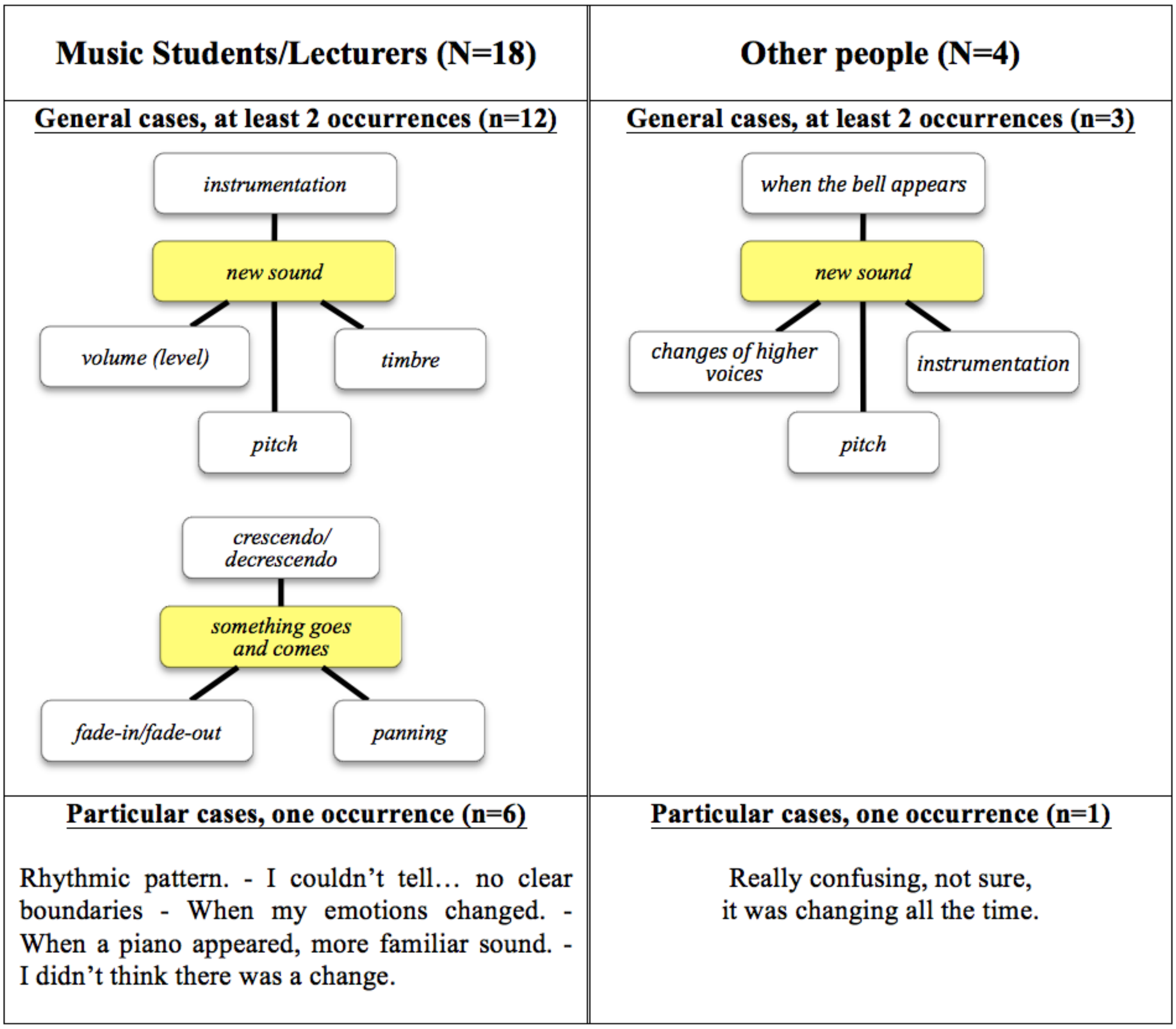


FIGURE 5. Semantic analysis showing signifiers in boxes. Yellow boxes summarize a cluster. Each case has one or two occurrences of the signifier. The number of participants in each subset is shown in parentheses.

When observing participants' segmentation points superimposed to the spectrogram of the audio file (Figure 6), it is easy to note that they are very close to the shaded areas representing the boundaries of sound events, consistent with what participants described in their strategies for segmentation. The starting of a *new sound* can be recognized by a zone of darkness at any point of the spectrum (a line or a block) and the glissandi (curved lines) that account partially for the phrase *something that comes and goes* are also quite clear. However, this is just a broad observation and it is not possible to claim which are the most accurate points of segmentation, from the participants or computed sequences at different resolutions and density values.

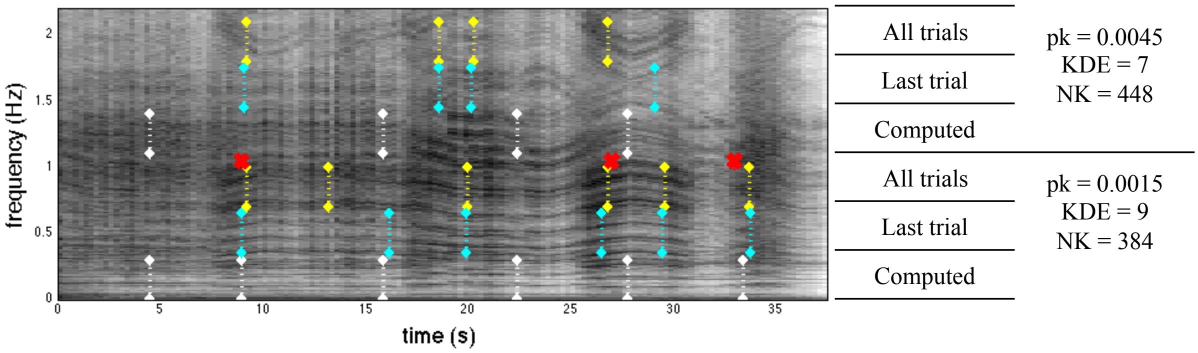


FIGURE 6. Spectrogram with superimposed participants and computed segmentation points at different resolutions. Points with greater consistency amongst all observations marked in red.

3.4.7 Discussion

The obtained Similarity values between computed and participants' segmentation at different levels of resolution might indicate that some participants were rating segmentation at a more fine-grained resolution than others. Although it is not totally consistent with the human participants' ratings, the Novelty function seems to be a good approximation to model human segmentation, given the remarkably high levels of similarity to participants' segmentation. A visual inspection of the spectrogram against segmentation points and the participants strategies give a good indication that participants were indeed rating according to novelty in the spectrum. It seems clear that the main cues for segmentation are defined by overall change in pitch and energy, which supports previous investigation. Further studies in this field could investigate the similarity of participants ratings with other algorithms to compute segmentation, which could better account for relevant perceptual cues.

Participants did not give more coherent responses in subsequent listening, which does not support the hypothesis that responses improve in accuracy as more times the stimulus is listened, as suggested by Bailes and Dean (Bailes & Dean, 2007a; Bailes & Dean, 2007b). One possibility is that attention to different characteristics of the audio content is taking place in subsequent listenings and that some of these consolidate with time at the same time that some others emerge as more relevant. Further research should investigate more thoroughly the evolution of ratings in subsequent listenings.

The amount of participants should also be taken in consideration. This study involved a relatively small amount of participants. It would be pertinent to repeat the experiment with a larger amount of participants, so that more statistically relevant results are obtained and also to evaluate in a more detailed manner their individual traits such as musical sophistication or personality. It is important to acknowledge that the results of this experiment apply only to the stimulus used and should be not generalized to all kinds of music nor to electroacoustic music in particular. Apart from using more participants and a wider variety of stimuli, further investigation should solve the problem of layer discrimination. While data analysis of this experiment showed the characteristics of sounds that participants regarded as segments, it failed to clearly show which sounds in the stimulus were setting the boundary points, because the stimulus is composed by more than one layer of sounds.

3.5 Experiment 2: Segmentation of a Single-Layered Acousmatic Stimulus

3.5.1 Aims

This experiment was designed after Experiment 2 to narrow the observation of participants' segmentation, by using a composed stimulus rather than a proper acousmatic music piece. The stimulus was composed of sounds put together one after the other. This provided a single layer simplifying the problem of finding which layer the participants were effectively segmenting to, as happened in Experiment 1. The data analysis involved techniques previously used in Experiment 1.

3.5.2 Participants

Twenty-one participants took part in this experiment, with ages ranging from 21 to 49 years and a median of 26. In the group 33.3% were music students at undergraduate or postgraduate level or staff at the University of Jyväskylä, including those in the Music Psychology training programmes, while 66.6% were undergraduate or degree students from other areas at the same university. Participation was voluntary and a chocolate was offered as reward. A questionnaire administered to participants (described below in Sub-section 3.5.3) shows that the average level of attention to sounds was close to "pretty much" and the average familiarity with Electroacoustic Music as a genre was between "I have heard it but not too much" and "I have heard it and I know a little bit of it". The actual data used in the analyses was of 20 participants. Data of one participant was removed because of evidence of not properly following the instructions of Experiment 4. Since the results of the experiments will be compared the data of that participant for this experiment was also removed. Details are given in the data analysis of Experiment 4.

3.5.3 Stimulus

The stimulus was composed by concatenating 24 distinct sounds, without crossfading or gaps between them. By doing this, the stimulus resulted in a single-layered audio stream, as deemed pertinent after Experiment 1. The sounds were chosen according to a subjective classification made by the researcher. This was done to have an assortment of sounds that could occur in everyday life as well as other sounds that could be more abstract. This would allow to observe possible differences in perception. Sounds were classified in four groups: produced by a human, produced by an element of nature or animal, produced by a human-made device and of ambiguous nature. All sounds except those in the "ambiguous" class were high-fidelity recordings. Ambiguous sounds were either digitally processed recordings or produced by synthesis. The majority of the sounds were found in the internet at www.freesound.org and have license for private use and sharing. Some sounds were taken from the IADS-2 catalog which was provided by their authors (Bradley & Lang, 2007). After a preliminary literature review it was thought that all the sounds for the stimuli could be taken from the IADS-2 catalog. However, unfortunately most of them are poorly recorded, which might affect perception especially in the case of the experiment about mimesis since in that experiment the same sounds were presented separately. Still, some sounds appearing in the mentioned catalog were used. Table 4 shows the subjective classification made by the researcher, the duration and the order n of appearance.

The stimulus had a total duration of 121.4 seconds and while the level of the whole audio file was normalized to -3dB, the levels of the individual sounds were not normalized and were presented at a level that was deemed proper considering subjectively the nature of each sound. No normalization was done between sounds to prevent an unnatural overall sound. The playback level was adjusted to be comfortable following suggestions of participants in a pilot test and was kept the same for all participants.

TABLE 4. Order, subjective description and classification of the sounds and their durations in seconds.

Concatenated Sounds			
n	**description**	**class**	**duration**
1	baby laughing	human	1.1
2	man cough	human	2.9
3	bursts	ambiguous	1.7
4	synthdemon	ambiguous	4.0
5	dragbrick	ambiguous	4.1
6	slot machine pays	human-made	6.0
7	parrots singing	nature/animal	8.4
8	rain	nature/animal	7.0
9	telephone waiting signal	human-made	6.9
10	man breathing asleep	human	4.8
11	synthclock	ambiguous	4.0
12	boiling water in a pan	ambiguous	6.9
13	WC	human-made	5.6
14	chainsaw	human-made	3.9
15	dog growling	nature/animal	0.9
16	rubber duck	nature/animal	2.7
17	female moan	human	1.4
18	adolescent scream	human	2.0
19	crybaby	ambiguous	1.4
20	lake waves	nature/animal	5.6
21	crowd celebrating	human	12.8
22	lightning strike and thunder	nature/animal	11.1
23	fireplace	nature/animal	6.2
24	bicycle rearwheel	human-made	9.7

3.5.4 Procedure

The data recordings for this experiment was done in the same data recordings session for Experiments 3 and 4 for each participant. The sessions were carried out in a fairly well acoustically isolated facility at the University of Jyväskylä Music Department. The session started with the researcher giving the participant a brief explanation on the use of the Wii Remote controller. The "A" button of the Wii Remote was marked red to aid the participant to identify it. Also the participants were given an overall description of the procedure, like the total approximate time the whole session would take, that the session was divided in three parts starting with the most difficult tasks (as indicated by participants in pilot recordings) and that there would be a pause between each part in which they could rest shortly. Also participants were told that they were going to listen to music with headphones and that the sound might get loud but that it would not be harmful. Additionally they were told that if at any point they wanted to quit the experiment they could do so and still would receive the offered chocolate in reward. The data for this experiment was collected in the first part of the recording session.

After the introduction the participant was invited to seat in front of a computer running the Visuaural program of the first part of the session and to put on the headphones. This part comprised data recordings for this experiment and for Experiment 4. The participant had to perform continuous ratings of Segmentation, Valence and Activity for the stimulus in subsequent listenings. The participant was first presented a screen with the instructions of the three tasks (see Figure 7).

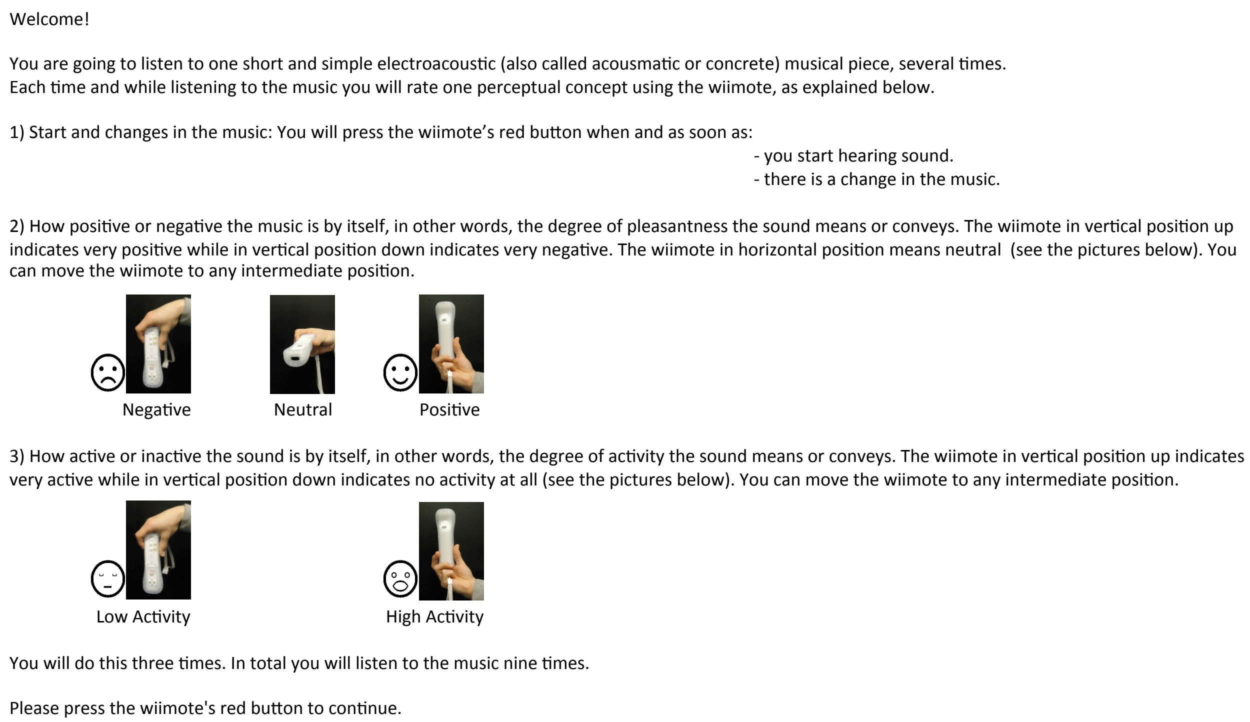


FIGURE 7. Instructions for the first part of the data recording of Experiments 2, 3 and 4 as presented by Visuaural.

A second screen added the following:

> "You should do your rating according to what the music represents to you, which might not necessarily be how it makes you feel. For example, at a certain point you can hear that what sounds is in nature negative but you do not necessarily feel negative. At that point you should rate it as negative with the wiimote pointing down.
> Please mind that there are no good or bad answers, it only counts what you perceive.
> Now you will perform a practice, so afterwards you are confident on how to proceed.
> Please press the wiimote's red button to start the practice."

Then the participant went through a practice stage consisting of the three tasks three times, using a short stimulus composed of different concatenated sounds than the stimulus to be rated. The researcher stood by the participant at to check if the ratings were done correctly but avoiding inducing bias. The researcher limited to point out the order of the tasks (Segmentation-Valence-Activity). No prescription or recommendation was made on to how to rate the stimulus. After the practice the researcher left the room asking the participant to go out when this part of the experiment was finished. After each listening and rating the participant was presented a black screen with white letters reading a succinct description of the task as shown below and a counter showing the amount of trials done and the amount of trials left.

- Segmentation (Wiimote red button)
- Valence (Wiimote up-down)
- Activity (Wiimote up-down)

The participant performed the task while listening the music. This was repeated 3 times. In total the participant heard the piece 9 times. Participants took between 20 and 25 minutes to complete this part. These recordings correspond to Experiment 2 (Segmentation) and part of Experiment 4 (continuous rating of Valence-Activity). For the segmentation task, Visuaural recorded in a text file a semi-colon separated line with a zero every $1/10^{\text{th}}$. of a second unless the Wii Remote button was depressed, in which case a 100 was recorded. The third and last part of the recording session consisted in a questionnaire with questions such as age, occupation and familiarity with electroacoustic music and attention to sounds, as shown below. The latter two questions were required to be responded in a Likert scale:

1. How much do you pay conscious attention in a non-functional manner to sounds that would not be called "musical" in a traditional sense?. This means whether you pay attention to the characteristics of the sound, "how the sound is" rather than how it would affect you. For example, paying attention to the "melody" of the meow of a cat. Another example:

paying attention to the sound of the engine of a truck and imagine that it might sound threatening or violent. Last example: paying attention to the sound of the urban transit imagining how similar it is to the sound of the sea waves. Please take a moment to think about this for you might have had these kind of experiences without noticing or without giving them too much importance. Rate to what extent this happens to you. (0 = Not at all, 1 = Very seldom, 2 = Sometimes, 3 = Quite a bit, 4 = Pretty much, 5 = Very much, 6 = Almost constantly)

2. Please rate the degree of familiarity with (e.g. how much you know about or how often do you listen) a kind of music called "Electroacoustic Music", also sometimes called "Acousmatic" or "Concrete" music. It is a musical genre that uses any sound as musical element, is made with recording equipment and often with computers. A more effective description of it is that "it is like a landscape made of sounds and it sounds nothing like any traditional music". Do not confuse with dance electronic music or music that uses electroacoustic instruments but could be as well played with acoustic instruments. (0 = I have never heard such kind of music before, 1 = I might have heard something like it before, 2 = I have heard it but not too much, 3 = I have heard it and I know a little bit of it, 4 = I sometimes listen to it and I know it quite well, 5 = I often listen to it and I know it very well, 6 = I am an expert);

3.5.5 Data Analysis

The data analysis of the segmentation sequences was almost the same as in Experiment 1, with the difference that in this experiment the time points at which the sounds in the stimulus were placed were used as another segmentation sequence to compare. This sequence will be referred to as "stimulus time-points". When comparing participants' and computed segmentation sequences at different KDE and NK kernel widths, only one similarity maxima $S = 0.94$ emerged at pk = 0.0015, KDE = 9 and NK = 256 for both all trials and last trial. The maximum peak threshold evaluated was pk = 0.025 because at a higher value and at some KDE values no points were produced. The comparison between the stimulus time-points (as explained in Section 3.5.3) and participants sequences at different pk and KDE values had a maximum $S = 0.86$ at KDE = 8 and $0.0005 \geq pk \leq 0.0015$ for all trials and a maximum $S = 0.87$ at KDE = 4 and pk = 0.002, for the last trial. Finally, the comparison between computed sequences at different NK values had maxima at NK = 192 and 256. In all comparisons the ranges and step sizes as well as the settings to compute segmentation with the Novelty function were the same as in Experiment 1, except for the peak threshold (pk) as explained previously.

3.5.6 Results

The outcome of the data analysis shows that there is more similarity between participants and computed sequences than between either to the stimulus time-points. Also the last trial sequence achieved greater similarity values when compared to the stimulus time-points. The comparison of similarity between subsequent trials returned very high similarity values of $S = 0.9988$ and $S = 0.9990$ for trials 1-2 and 2-3 respectively, with an average $\overline{x}_S = 0.9989$ and SD $= 0.00014$. Table 5 contains all the participants' segmentation points and the computed points. Since participants were asked to press the button when the stimulus started, the first point is not aligned with any of the computed points. However, if this first point is taken as a reference lag and subtracted from the sequences, they become closer to the computed one. Table 6 shows the distances $d(a, b)$ and the closest sequence is the last trial with the value of the first point subtracted to all the sequence. Therefore, this suggests that participants were indeed rating segmentation based on spectral characteristics as the Novelty function does.

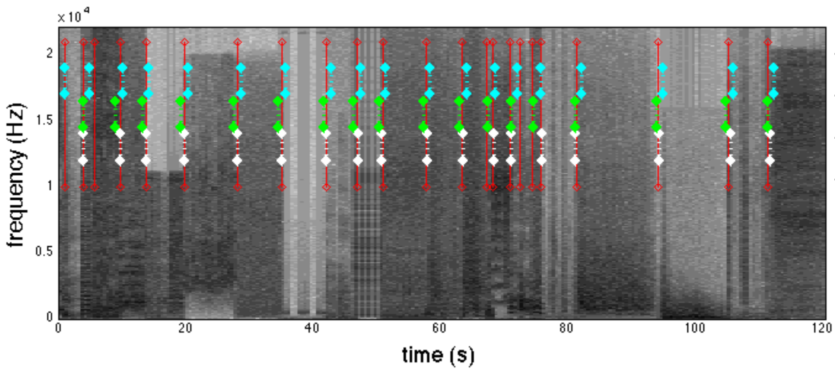
TABLE 5. Participants' segmentation sequences at pk = 0.0015, KDE = 9 and NK = 256. KDE and segmentation points are expressed in seconds. Rows from top to bottom contain sequences for all trials, last trial, computed and stimulus time-points.

	segmentation points																						
All tr.	1.2		5.0	10.3	14.4	20.5	28.7	35.7	43.0	47.7	51.5	58.5	64.2		68.7	72.4			75.7	82.4	95.2	106.2	112.5
Last tr.	1.1		5.0	10.2	14.3	20.4	28.7	35.7	42.9	47.5	51.5	58.5	64.2		68.6	72.2			75.8	82.3	95.1	106.1	112.5
Comp.		3.9		9.7	13.8	19.8	28.1	35.2	42.2	47.1	50.9	58.0	63.6		68.5	71.2			76.1	81.3	94.4	105.6	111.8
Stim.	1.1	4.0	5.7	9.8	13.8	19.9	28.2	35.2	42.2	47.0	51.0	57.8	63.5	67.4	68.4	71.0	72.5	74.5	75.9	81.5	94.3	105.3	111.5

TABLE 6. Distances between participants' and computed sequences d_{pc} and between participants' and stimulus time-points sequences d_{ps}. Participants' sequences do not contain the first point and d values are without lag offset (raw) and with lag offset.

trials	**comparison**	d_{pc}	d_{ps}
All trials	raw	0.68	0.62
	lag offset	0.57	0.42
Last trial	raw	0.61	0.57
	lag offset	0.53	0.39

The spectrogram of the audio file with superimposed segmentation points (Figure 8), at a first glance show very clearly the boundaries at zones of changes of energy, the same as the computed sequences. While the similarity measure show high values, this does not indicate segmentation of all individual sounds. 19 sections have been segmented both by participants and the Novelty function, but 5 remained merged with other sounds. The segmentation points produced by the Novelty function and by participants at the longer sounds are very close, with or without lag offset. However, the lag offset sequence, while being closer in distance, shows problems of incongruence at the shorter sounds. At those areas, chiefly at approximately 70 to 80 seconds, when applying the lag offset the segmentation points by participants shift from being closer to one stimulus time-point to the previous one. It is not possible to state clearly to which point they actually correspond. Likewise, at the first 10 seconds, it seems that the first point of the raw participants' sequence could be either the reaction to the start of the stimulus or to the first sound that is also short as the zone from 70 to 80 seconds. This could most possibly be caused because the time of reaction is too short to make an accurate rating at those points. Regarding the computed sequences, the Novelty function with the settings used was not able to segment closer to the stimulus time-points than participants.



Last trial	
raw	pk = 0.0015
lag offset	KDE = 9
Computed	NK = 256

FIGURE 8. Spectrogram with superimposed segmentation points. Participants' last trial segmentation sequence raw values in cyan and with lag offset in green. Computed segmentation sequence in white. Stimulus time-points in red.

3.5.7 Discussion

In this experiment participants did not give more coherent responses in subsequent listening. Because of this it is not yet possible to prove the hypothesis that responses improve in accuracy as more times the stimulus is listened. The results also show that participants segmentation are very close to segmentation computed with the Novelty function. However, when comparing participants' sequences to the stimulus time-points it is difficult to assess participants' segmentation at short sounds, most probably due to the time required for reaction and rating. However, for the longer segments, both the participants and the Novelty function performed well in comparison to the stimulus time-points. Since the points that are conflictive have a duration of up to approximately 2 seconds it seems appropriate to discard the measurement of sounds with greater durations. The double of that distance would allow the similarity measure to completely match points nearby without the risk of finding false matches. Thus, to use the first point as a simple measure of lag, this experiment could be improved by only placing a sound with at least a duration of 4 seconds at the beginning. Also it seems that because of the psychological and motoric mechanisms involved, continuous self-report should not be applied to get fine-grained results. Rather, more direct mechanisms could be used such as measurement of brain activity or physiological response. Nevertheless, continuous-self report could still be used as a valid measurement technique when quick reaction is not required.

3.6 Experiment 3: Recognition of Source and Action in Sounds

3.6.1 Aims

Mimesis was the object of study in this experiment. This aspect of perception was measured by clustering written statements of participants on the source of sounds that they were presented with and also the action of that sources, that resulted in the production of each sound. An improved semantic analysis after the one used in Experiment 1 was performed upon participants responses. This allowed to observe the level of participants' agreement in their assessments. It was hypothesized that some sounds classified as ambiguous would yield less agreement than others.

3.6.2 Participants

The participants of this experiment were the same of Experiment 2.

3.6.3 Stimuli

The set of stimuli used in this experiment were the discrete sounds used to compose the stimulus of Experiment 2, with no changes.

3.6.4 Procedure

The data recording for this experiment was done in the second part of the data recording sessions for Experiments 2, 3 and 4. The participant was invited to sit in front of the computer, put on the headphones and to use the computers' alphanumeric keyboard. A screen appeared with the instructions (see Figure 9) and two subsequent practice questionnaires appeared. The researcher stood beside the participant to indicate the correct usage of the interface avoiding the induction of response bias. The researcher limited to point out that a first click on a blank space was required to activate the screen, that the key "Tab" does not jump to the next text entry box (as most web browsers allow and therefore participants could infer that this interface would behave the same), that the "Command" key was forbidden (this enters the editing mode of Visuaural, to avoid this is not easy but a fix is planned for a future release) and the correct concepts of "source" and "action" asked in the questionnaire (see Figure 10). The questionnaire included Likert scales to rate perceived Valence and Activity. These had an icon face at each extreme representing the highest and lowest values of each emotion dimension. The icon faces were inspired by the ones used in the Emujoy software (Nagel, 2007). Without recommending a specific strategy to identify source or action of sounds, the researcher stressed that "source" refers to the entity (object, person, animal, *thing* in general) that produced the sound. "Action" was defined as the physical movement that the source executed in order to produce the sound. The participant was told to preferably use one word, for the former case a noun and for the latter a verb, but if no single word was available for them, that they should do their best and explain either specification in more than one word if necessary. After the practice the researcher left the room asking the participant to go out when this part was finished. Participants completed this (second) part of the recording session in 10 to 20 minutes. In this part Visuaural presented the sounds in random order and a text file was produced for each sound indicating the order of presentation for the current participant, to keep them organised and make more efficient the data analysis.

Welcome!

You are going to listen to 24 different short sounds. After each sound you will respond to a short questionnaire.

You will rate the following:

1) How positive or negative the sound is by itself, in other words, the degree of pleasantness the sound means or conveys, in your opinion.
2) How active or inactive the sound is by itself, in other words, the degree of activity the sound means or conveys, in your opinion.

You can get an idea of these concepts by looking at these pictures:

You should rate according to what the sound represents to you, which might not necessarily be how it makes you feel. For example, you can hear a sound that is in nature negative and active but you do not necessarily *feel* negative and active. Then you should rate it as negative and active.

3) The source that produced the sound, in other words, the object or entity that produced it.
4) The action that produced the sound, in other words, the action of the source that resulted in the sound.

For example:

Source: Engine of a car — Action: accelerating
Source: Leaves of a tree — Action: moved by the wind as it blows through

Please give one definite answer for each avoiding ambiguous responses such as "could be a bird or a whistle".

Please mind that there are no good or bad answers, it only counts what you perceive.

Now you will perform a practice, so afterwards you are confident on how to proceed.
Please click on the button below when you are ready to start the practice.

START PRACTICE

FIGURE 9. Instructions for the second part of the data recording of Experiments 2, 3 and 4 as presented by Visuaural.

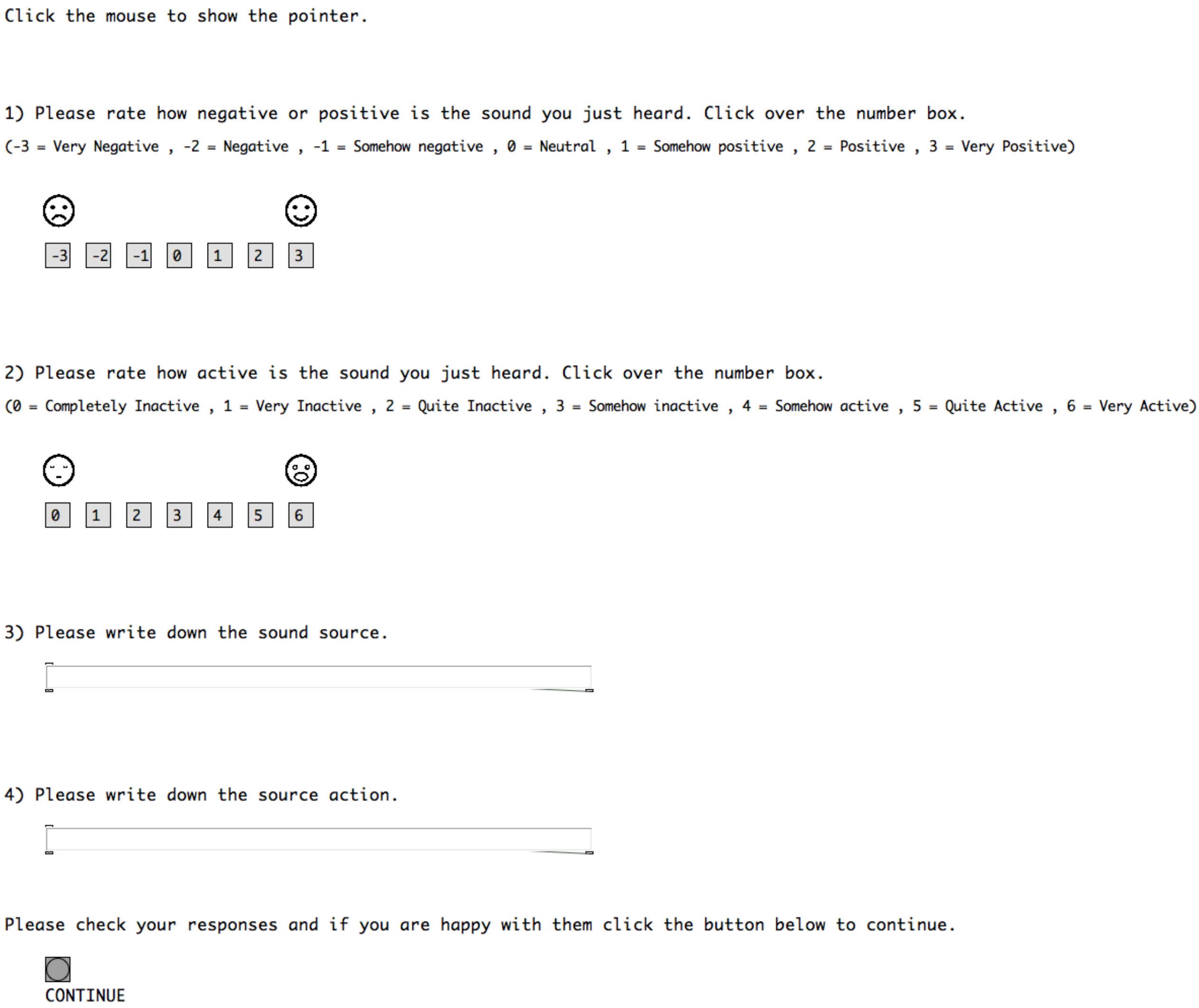


FIGURE 10. Questionnaire of the second part of the data recording of Experiments 2, 3 and 4 as presented by Visuaural. Data was used for Experiments 3 and 4.

3.6.5 Data Analysis

Written answers given by participants underwent a simple semantic analysis clustering procedure taking as context the list of answers for each sound. First the pairs source-action were inspected one by one. This inspection revealed that the discrimination between source and action was in many cases not completely clear and the identification of either varied in semantic distance (see Rips, Shoben, & Smith, 1973) although this was not quantified. For example, in sound #3 most participants responded "gun - shooting","gun - war" or "machine gun - shooting", whereas one participant responded "soldier - firing a machine gun". In sound #23 most participants responded "fire - burning" while some responded "wood - burning" or "fire - cracking". Each of these groups therefore corresponded to a cluster, in sound #3 having the general idea of "gun-shooting" and in #23 of "fire-burning". However more distant semantic meanings in terms of thesaurus hierarchies were also found. For example in sound #22 most participants responded "thunder-striking", "lightning-striking" or "sky-thundering", whereas one participant responded "heaven-thunder". Fortunately this participant, whose mother tongue was not english, declared to the researcher after the experiment that had used the word "heaven" to designate the place where "rain" is produced. This was a lucky coincidence. Sound #15 posed another peculiarity. All participants responded that the sound was produced by an animal such as dog, pig, or just "animal" and as such were grouped into one single cluster. However, to sound #14 most participants responded "chainsaw" as the source but one participant responded "hairdryer" and other responded "blender". In the case of sound #15 the extracted semantic pair was "animal-growling" whereas in sound #14 the extracted source was "chainsaw" even though the two outliers could be considered into that cluster if the extracted source was deemed to be "mechanical device". The distinction is debatable, but the justification in this case is that in sound #15 all participants responded to the same concept and with a more even distribution in sub-categories (e.g. pig, bear, dog, cat, animal) than in sound #14, where the word or synonyms for "chainsaw" appeared in all cases but of the outliers. The complete dataset can be consulted at Appendix E. Therefore the pairs action-source clustering can serve only as a rough approximation to observe the coherence of participants' answers and a different research question would require different semantic distance thresholds. Figure 11 provides a visualization of the described semantic clustering.

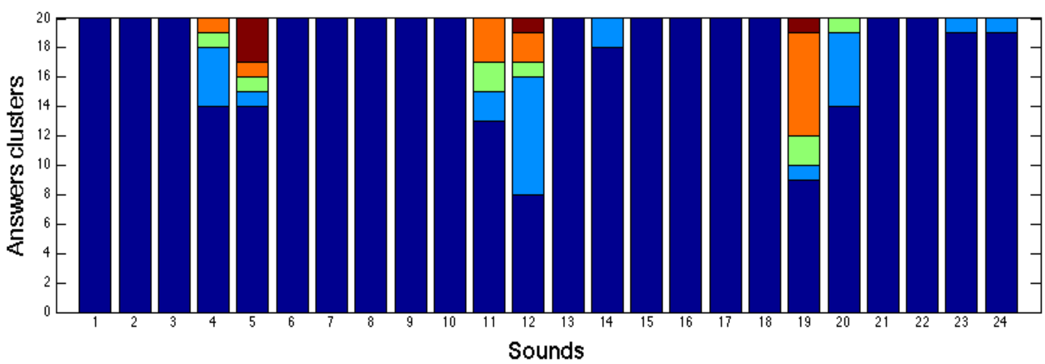


FIGURE 11. Semantic clusters for each sound. Each cluster is represented with a different colour and sounds are indexed as they appear in the concatenated stimulus.

TABLE 7. Semantic clustering for sound #12.

partic.	source	action	cluster
1	water	rain	1
2	water	water is boiling?!	2
3	a man	a man urinating too	3
4	cooking pot full of water	boiling	2
5	rain	rain falling on concrete	1
6	a kettle on a stove	burning and boiling	2
7	water	water boiling	2
8	Water	Coming out of the tap	4
9	gas grill	meat cooking	2
10	Part of a jacuzzi	The underwater sound of a water pump that creates the bubbles etc. in a jacuzzi	5
11	pot with water	boiling water	2
12	Oil in a pan on a gas cooker	Frying food	2
13	A small river with a little fall	water falling	4
14	rain	raining	1
15	rain	falling to ground nearby	1
16	Water	hitting the ground in the form of rain	1
17	heaven	raining	1
18	Water	Boiling	2
19	water hitting ground?	raining	1
20	clouds	raining	1

3.6.6 Results

Overall there was a very high degree of agreement amongst participants (see Figure 11). All of the sounds that presented less agreements were classified at the design of the experiment as "ambiguous". However, sound #3 (*bursts*) that was also in the same class had a high level of agreement. Further than the cluster analysis, the examination of the answers show in many cases subtle differences between what participants' responses in the same cluster. For example in the set of responses to sound #4, cluster 1, most participants describe the action "whispering" but one goes further and answers "demon says. where are you?", while other participant even mention fictional characters in popular culture such as "Gollum", the character of *The Lord of the Rings*, that makes a *"horrible swallowing noise in his throat"* (Tolkien, 2002) and "Voldemort", the evil wizard appearing J.K Rowling's *Harry Potter*. Both fictional characters have appeared with their characteristic voices in cinematographic versions of the novels. However, another very distinct cluster was found for the same sound, which designates as its source a blowing torch. It is convenient to remember that this sound was produced by modulating white noise with a filter that applies vowel formants. Another remarkable kind of answers are the ones in which participants went even further than merely mention source and action, but gave a more complete picture of a situation occurring (see Table 8).

TABLE 8. Narrative responses from participants go beyond identification of source and action.

sound	partic.	source	action	cluster
7	5	a group of small birds	the birds fight over a piece of bread on a shore	1
10	10	A person who is stalking somebody by calling them	The stalker breathing heavily over a telephone	1
	13	a man	taking a deep breath either because of sad feelings or because of tiredness	1
11	12	Metal balls hitting each other (part of this pendulum-type of device where four metal balls hang next to each other)	Activating the above-mentioned device	4
14	11	blender	somebody put food in the blender to chop it in little pieces	2
15	10	A big cat (leopard, cheetah or something like that)	Growling in distress	1
	13	An animal, maybe a dog	the animal is frigtened or angry, and making this sound because of that	1
20	5	a lake and a boat	rowing the boat on a calm lake	2
	10	A person swimming	Someone slowly swimming in still water	3

3.6.7 Discussion

Although the semantic clustering provide a rough approximation of source-action agreement between participants, it serves as a first guide to see the critical points of both agreement and disagreement. In this experiment the majority of descriptions were agreed and the those that had greater disagreement were mostly the ones predicted at the design stage by the classification "ambiguous". Instead of being done manually this procedure could be done automatically using a technique of computational assessment of semantic similarity (Harispe, Ranwez, Janaqi, & Montmain, 2013) using different mappings of meanings (in information retrieval called "ontologies") and resolutions (what here have been called semantic distances thresholds), to obtain richer descriptions of participants' descriptions.

Participants have given mostly specific source descriptions, responding the request to forcedly find a source and an action. Interestingly, some of them went further, elaborating a narrative complement. This occurred spontaneously on some participants and responding to some sounds. It is not possible to know if other participants would have done the same if requested. The sole fact of finding these spontaneous responses in more than one participant suggests that they were eager to elaborate and this might extrapolate to the rest of participants. Still, confining the observations to the available results, it seems that further from the sound recognition a narrative has to be created to evaluate the sound in question, most probably one that draws from individual experience. This individual experience in most cases is not isolated and occurs in clusters with very close ideas, as for example "boat/rowing" occurs in 25% along with a larger cluster "water". This behaviour can be observed repeatedly and along with the consistent links to popular culture icons support the idea that ideas and imagery drawn from the aural experience are a bond between personal and collective experiences.

3.7 Experiment 4: Continuous and Post-Hoc Perception of Emotions in a Single-Layered Acousmatic Stimulus

3.7.1 Aims

The design of this experiment was targeted to the measurement of perceived emotions in two conditions. The first condition was *continuous*, in which participants rated perceived emotion while listening to a stimulus composed of several concatenated sounds. The second condition was *post-hoc* and participants rated the sounds used to compose the stimulus of the continuous condition, after listening each of them separately. Then the results of ratings in the two conditions were compared. It was hypothesized that perceived emotion might change considerably between these two conditions, mainly because of the effect of context provided by previous recently heard sounds in the continuous condition.

3.7.2 Participants

The participants of this experiment were the same of Experiment 2.

3.7.3 Stimulus

The stimulus used in this experiment was the same of Experiment 2.

3.7.4 Procedure

The data recording for this experiment was done in the same data recording sessions for experiments 2 and 3. The present experiment is concerned with the continuous and post-hoc ratings of the Valence and Activity dimensions of emotions. Continuous ratings of Valence and Activity was done by participants with the Wii-Remote (described in Section 3.5.4) while listening the stimulus made up of concatenated sounds (described in Section 3.5.3). The post-hoc ratings of Valence and Activity was done by means of a questionnaire (described in Section 3.6.4) after listening each stimuli comprised by a single sound (described in Section 3.6.3).

When the participants were given oral instructions the researcher asked the participants to use the Wii Remote in its full range if necessary to rate Valence and Activity. For these tasks Visuaural recorded in a text file at a rate of 10Hz a number between -100 and 100 according to the data sent by the Wii Remote.

3.7.5 Data Analysis

The Activity and Valence post-hoc ratings that participants made using the questionnaire were firstly organized in the order of appearance of each sound in the stimulus of concatenated sounds used for the continuous measurement. Then the values of the original Likert scale of 7 points were scaled to a range between 0 and 2 and a time-series was generated for each participants' dataset with these values at the boundaries of the sounds in the stimulus. The sampling frequency and length was matched to those of the continuous recordings. To properly perform further correlation analysis, each time-series was centered to have zero-mean and therefore a normal distribution. To preserve each participants' ratings no further scaling was done.

The continuous data of Valence and Activity ratings were extracted and carefully labelled with a code to know at each point in the analysis the correspondence to participants and therefore match them to the post-hoc time-series. Firstly the Wii Remote's data noise was removed with a finite-impulse response window-based low pass filter with a cutoff frequency of 0.9 Hertz and whose impulse response has a wide slope, allowing to remove noise without generating too many artifacts. This kind of filter was chosen because of its effectivity in removing the targeted components in the signal and also because it has a uniform delay, making it easy to compensate it by shifting the sampled points. Then the data was centered to have zero mean and thus a normal distribution that allowed correlation analyses. Like with the post-hoc measurements time-series, to preserve each participants' ratings no further scaling was done.

A preliminary correlation analysis was performed, where a matrix of Pearson's r coefficients revealed consistency among all the participants with $p<0.05$, except for one participants' data that was considered outlier and therefore removed. Visual inspection of this participants' data revealed that contrary to the rest, this participant rated the sounds by moving the Wii Remote to one position and immediately turning it back to the middle, whereas all other participants followed the instructions and held the Wii Remote or moved it according to the perceived emotion. Using the same measure significant correlation was found within each participants subsequent trials.

Next, cross-correlation was evaluated between each pair of the post-hoc time-series and each trial of continuous recordings time-series for each participant at lags of ± 20 sample points. For each of these pairs, the lag at maximum correlation was used to shift the continuous recordings time-series, compensating the delay produced by the recording system. Since this was the second delay compensation, an artifact produced by the filter at the end of each sequence showed to distort the last portion of the signal. This was smoothed by replacing the last 8 sample points with the averaged value of the previous last 10 sample points, giving a fairly plane line as in the raw data, without considering the noise. Then the continuous measurements time-series were segmented at the time-points of the concatenated sounds stimulus. At each of these segments the mean was computed. A line at the mean was placed along the duration of the segment. Then correlation and distance was computed between the post-hoc measurement time-series and each trial segmented and averaged time-series. The stages of this procedure can bee seen in Figure12.

To observe the similarity between post-hoc and continuous measurements, an average time-series of all participants post-hoc time-series and continuous time-series was computed. Only the continuous time-series with highest correlation to post-hoc time-series of each participant was used to compute the mentioned average. Then distance was computed between these averaged time-series (see Figure 13).

Finally, to compare the relationship between Activity and Valence with previous studies (Bradley & Lang, 2000; Bradley & Lang, 2007) a least-squares polynomial regression (Mathews & Fink, 1999) was performed upon their ratings, for both continuous and post-hoc measurements. Due to the small sample set the regression was done only to fit a curve of Valence as a function of Activity which was the pattern found by Lang and Bradley.

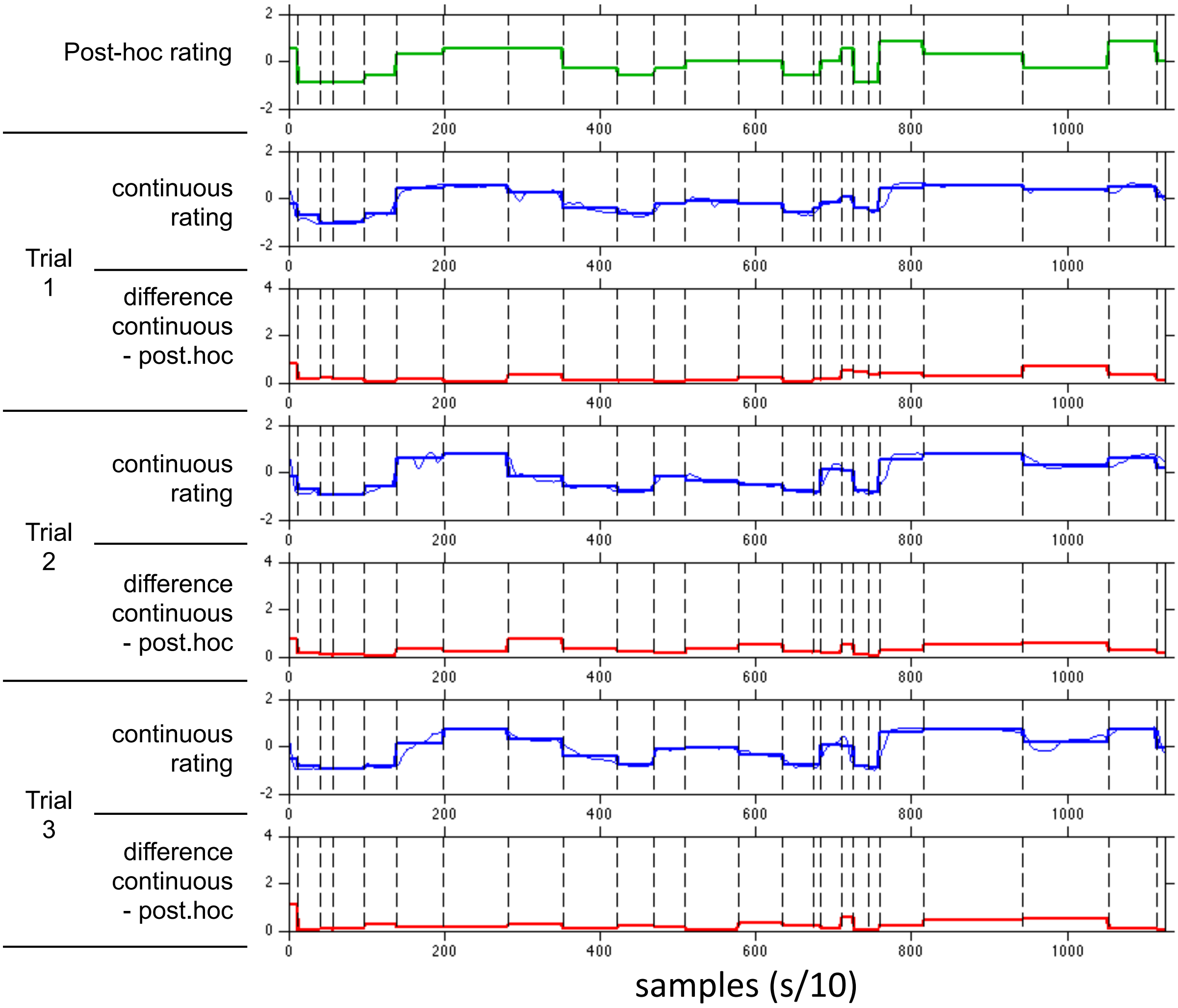


FIGURE 12. Time-series for ratings to Valence from one participant. The top graph (green line) shows the post-hoc ratings time-series. The graphs below show the continuous ratings trials after lag correction and segment averaging (thick blue line) as well as the unsegmented series (thin blue line). The graph with red lines show the difference between each segmented continuous time-series and the post-hoc time series. The horizontal axis stand for samples and the vertical axis for the scaled ratings. The vertical black segmented lines indicate the boundaries of the sounds in the stimulus.

3.7.6 Results

Apart from indicating intra-participant consistency, the correlation analysis of the time-series with lag correction revealed a high level of correlation between each trial of the continuous recording time-series and the post-hoc responses of each participant. Furthermore, the average delay times returned by the cross-correlation analysis revealed that the delay time slightly decreased in subsequent trials in the measurement of Valence and in the measurement of Activity. (see Table 9)

TABLE 9. Average lag times (in samples) of maximum cross-correlation values.

task	trials	average lag
Valence	trial 1	-17.90
	trial 2	-15.50
	trial 3	-15.45
Activity	trial 1	-18.90
	trial 2	-16.40
	trial 3	-15.95

Also the correlation analysis made upon the averaged time-series showed a slight tendency of the group to give more consistent results in subsequent trials (see Tables 10 and 11)

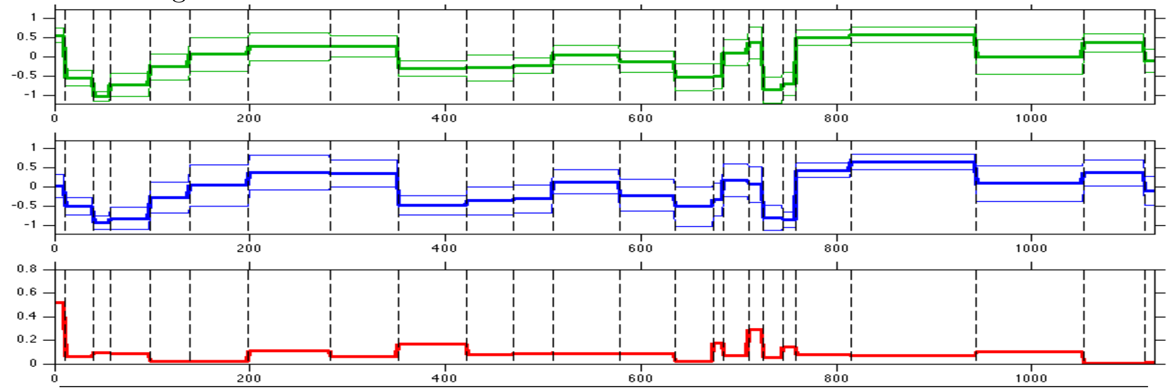
TABLE 10. Amount of participants and the trials of maximum cross-correlation value between post-hoc and continuous trials. Also maximum, minimum and average cross-correlation values for the group.

task	trials	participants	proportion
Valence	trial 3	10	0.50
	trial 2	9	0.45
	trial 1	1	0.05
Activity	trial 3	11	0.55
	trial 2	6	0.30
	trial 1	3	0.15

TABLE 11. Group cross-correlation values between post-hoc and continuous recordings.

task	measure	r
Valence	Maximum r	0.92
	Mean Maximum r	0.85
	STD r	0.06
	Minimum r	0.30
	Mean Minimum r	0.74
	STD r	0.14
Activity	Maximum r	0.91
	Mean Maximum r	0.79
	STD r	0.09
	Minimum r	0.45
	Mean Minimum r	0.69
	STD r	0.12

Valence average time-series:



Activity average time-series:

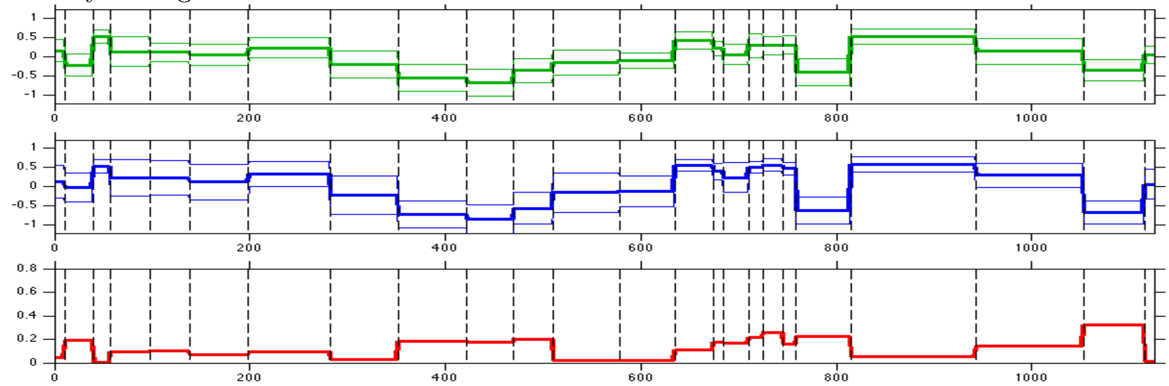


FIGURE 13. Group average time-series for ratings to Valence (top panel) and Activity (bottom panel). The thick green line shows the post-hoc averaged time-series. The thick blue line shows the continuous averaged time-series. Green and blue thin lines represent standard deviation. The red line shows the distance between post-hoc and continuous averaged time-series. The horizontal axis stand for samples and the vertical axis for the scaled ratings.

The graphics of the averaged time-series and their distance allow to easily observe the high degree of similarity between post-hoc and continuous measurements (see Figure 13). It was found that standard deviation values were higher for continuous averaged ratings than for post-hoc averaged rating. It is worth to note that in the case of Valence the maximum distance was observed at the sound at the beginning of the stimulus. This might be because the participant did not have enough time to move the Wii Remote to the desired position from the horizontal position. The same effect does not occur in the ratings of Activity because the post-hoc ratings are at the center position, the same as the starting horizontal position of the Wii Remote in the continuous rating. An additional examination was made of the relation of sound duration and distance. No consistent pattern was found when analyzing the distance between averaged post-hoc and continuous responses. Finally, the polynomial fit revealed the same "V" shape of Activity as a function of Valence obtained by Bradley & Lang. Figure 14 shows a visualization of the averaged and post-hoc ratings of Valence and Activity as well as the best fit curve obtained by polynomial regression.

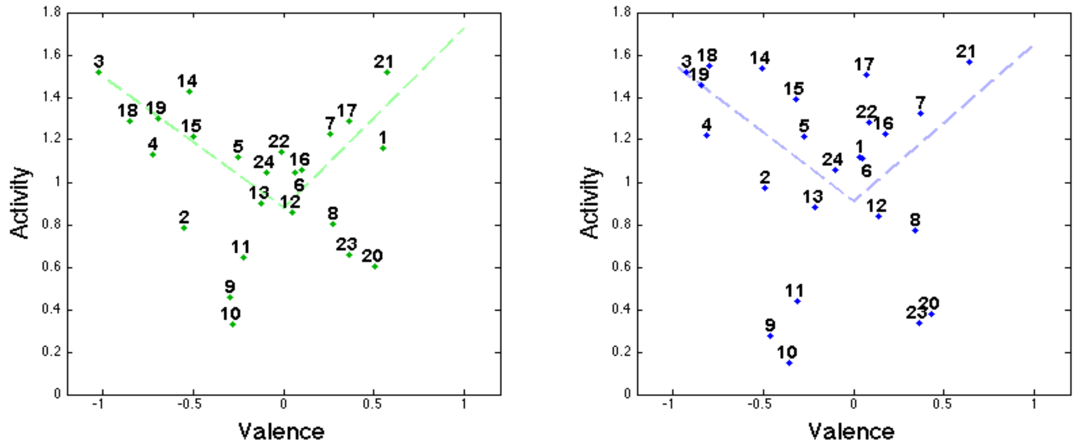


FIGURE 14. Ratings of sounds in the affective space. The panel to the left shows averaged post-hoc measurements and the panel to the right shows averaged continuous measurements. The numbers are the index of the sounds in the order they appeared in the concatenated stimulus. The segmented line is the best polynomial fit.

3.7.7 Discussion

This experiment has shown that post-hoc and continuous ratings of perceived emotions are remarkably close when the continuous ratings are done while listening to a stimulus composed of concatenated sounds and the post-hoc ratings are done after listening to each sound separatedly. Delay times decrease slightly in subsequent trials and best correlation between post-hoc and continuous has a tendency to be in the second and a stronger tendency to be the last trial. Also best correlations of post-hoc to continuous measurements occur towards the last trials. This suggests that emotional constructs might start building up when sounds are first heard and that they consolidate with time. The overall high correlation observed between continuous and post-hoc measurement of emotions indicates that for the conditions of this experiment context is not influencing perceived emotions, which is contrary to the hypothesis stated in the aims of this experiment. It seems that in this sample group, perceived emotion is a highly established construct that does not change significantly out of or into context. However this view can still be rather simplistic as at least this experiment alone does not reveal if the concatenated sounds provided an effective context. Participants might have understood the sounds as just a sequence instead of a proper narrative generating a context.

Nevertheless, even though the sample size did not permit a very clear image of the pattern of Valence vs. Activity obtained by previous studies, polynomial regression revealed that pattern, validating the measurements carried out. Despite the high consistency in the assessment of affect between both conditions, doubt should be casted upon the results of short sounds as short distances might be product not of accurate rating but of averaging ratings nearby as it might be the case of the low distance at sound 15 in the rating of Valence, compared with the preceding and following sounds. For this kind of measurement it might be wise in the future to consider sounds of at least the double of the highest lag measured. A good minimum, therefore, should be 4 seconds. However, measurement techniques other than self-report might provide better resolution results, such as measurements of physiological activity or brain activity. Still, self-reported measurement of emotions as presented in this study, seems to be highly reliable within its limits. No strong statements will be made at this stage because more testing of the technique should be made. In benefit of better statistical reliability, a more varied stimuli repertoire and a larger set of participants should be used in further investigation.

3.8 Compared Results of Experiments 2, 3 and 4

An overall comparison of the results obtained in experiments 2, 3 and 4 was done to search for a possible relationship between the three aspects being measured (see Figure 15). Only sounds with a duration longer than 4 seconds were considered because their associated ratings were deemed accurate in terms of Segmentation, as concluded in Experiment 2 and of Perception of Emotions as concluded in Experiment 4. No evident relationship was found between semantic clustering of source-action specifications and ratings of either Valence or Activity in neither post-hoc nor continuous measurements. As for a possible relationship between segmentation and semantic clustering of source-action no relationship was found other than the coincidence of segmentation with the boundaries of the individual sounds.

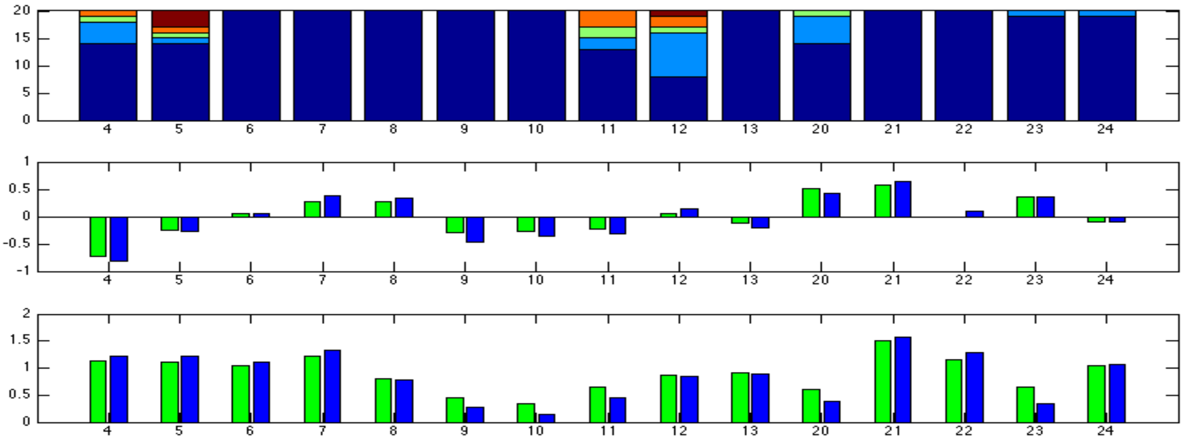


FIGURE 15. Compared ratings for sounds with duration of over 4 seconds. Panel at the top shows semantic clusters. The vertical axis in this panel stand for participants' answers. The panel at the middle shows ratings for Valence and panel at the bottom shows ratings for Activity. Valence and Activity ratings of post-hoc measurement are displayed in green and of continuous measurement in blue. The vertical axis stand for the scaled ratings. The horizontal axes of all these panels stand for the index of sounds as appearing in the concatenated stimulus.

4 GENERAL DISCUSSION

The investigation reported in this document has proposed self-report measurement techniques specific to the study of three important aspects of perception of acousmatic electroacoustic music: Segmentation, Mimesis and Perception of Emotions. For this purpose new tools were developed and techniques were adapted from previous studies of electroacoustic music and of other music genres as well as from previous investigation in ecological acoustics.

The produced data recording software proved to be effective in carrying out the experimental procedures. It also proved to be effective to easily design and quickly modify the experiment procedures as well as to efficiently organise the collected data. These virtues allowed to execute all four experiments within the given time for the project. The measurement of segmentation used in Experiments 1 and 2 provide two different ways of evaluating the problem. In the first experiment, participants performed segmentation of a complex and multilayered stimulus with sounds whose sources are abstract. The segmentation performed by participants as well as the strategies used to do so showed to be consistent with phenomenological approaches that regard the sound object as meaningful structural unit. In the second experiment participants performed segmentation of a single-layered stimulus. In this simpler experiment participants segmented according to both acoustical features and source-action specifications combined, which resulted to be remarkably close to the boundaries defined by the composition of the stimulus. The use of different kinds of stimuli provided an extended environment for observations which in future research could be further improved by more manipulation of the presented material. The data analysis of both experiments used the similarity measure previously developed within the project, which was used to assess intra-participant similarity and also similarity with the Novelty segmentation algorithm based in acoustical features. This similarity measure proved to be useful for the kind of data and to be simple to use, for no initialisation values have to be provided other than the ones known to the researcher. It was specially useful in assessing a considerable amount of pairs with different variables (in this case the kernel sizes) which shows that distinct areas of greater similarity can emerge and poses a further hypothesis: participants might have segmented at different levels of resolution, focusing in different cues to establish meaningful boundaries. The comparison of participants' segmentation to the computed Novelty function performed in these first experiments proved the high effectivity of the Novelty function algorithm.

Experiments 1 and 3 used a simple semantic analysis method that provides a general overview of the group responses of segmentation strategies in the case of Experiment 1 and of source-action identification in the case of Experiment 3. In the case of Experiment 3 this method provided a way of assessing the degree in which sounds can acquire different source-action specifications within a population. However these analyses can be highly debatable since the clustering depends on different ontologies. In future research the semantic analysis of responses on strategies and on identification of source-action would highly benefit with the use of automated topic extraction and other information retrieval techniques (see Harispe, Ranwez, Janaqi & Montmain, 2013).

Experiment 4 addressed the problem of evaluating consistency between post-hoc and continuous measurements of perceived emotions. The technique used to measure post-hoc and continuous perception of emotions appear as valid as corroborates the relationship of Activity as a function of Valence obtained in previous research (see Bradley & Lang, 2000). It also shows that accuracy compared to the post-hoc measurement improves in subsequent listenings, which suggest that the perceived affect consolidates with repeated listenings of the stimuli. The comparison between post-hoc and continuous ratings showed that these two conditions yield remarkably similar results, which does not prove the posed hypothesis that measurements in the two conditions may vary because of context in the continuous condition and the absence of it in the post-hoc condition.

The results obtained in all the experiments were then compared to get an overview of the relationships between the three measured concepts, although no relevant relationships were observed. However, from the results obtained in Experiments 1, 2 and 4, it is possible to gather that only measurements of events with a duration of 4 seconds are reliable. In the case of using the Similarity Measure for Segmentation, lag should not be more than the minimum segment with a duration of around 2 seconds and in the case of continuous measurement of Perceived Emotions a lag of approximately 2 seconds was found. If the minimum duration of sounds to be assessed is set to 4 seconds and the delay of the system is 2 seconds, there should be enough space to perform the distance calculation to assess similarity and to perform the averaging of the segments for the continuous ratings. Therefore a threshold of approximately 4 seconds is advisable for self-report measurements, which is near to conclusions emanated in previous work (Krumhansl, 1996;

Schubert, 2004). However, it is important to note that still there is a possibility that the perception of emotion in short sounds is indeed merged not by the physical action produced at recording as stated, but because of two or more short sounds being part of a a single perceptual affect. Further research on techniques to access the time area below 4 seconds is highly necessary for this zone is where the most part of the phenomenologically described sound-objects exist.

In the next lines more specific limitations of the described measurement tools and strategies are discussed, along with suggestions for further development. Despite Visuaural performed well for the requirements of this project, still there is much work to do. The first major necessary improvement is to carefully revise the dynamic patching routines to avoid unnecessary expenses in computing time that might end in crashing the system in some circumstances. Although this was not an issue in the execution of the presented experiments, it could be a problem when ported to other platforms. Another improvement that could be made is the visual interface, especially the presentation of questionnaires. Unfortunately this is not an easy task because of the limitations of the Pure Data programming environment. This problem can be effectively addressed by generating new objects in lower level programming. An easier problem to address is the building of Visuaural programs. Currently this has to be done manually by typing the commands into a text file, making the software unattractive to whom is not willing to do such labour. A new module could be added with the purpose of building a Visuaural program by means of an interactive graphical user interface and minimizing the input of text.

The technique employed to assess similarity could also benefit from further research. It seems that is the mathematicians job to do so, but the mathematics behind this measure are not of the most difficult kind. The main task now is to continue testing the algorithm and to better adapt it to the nature of the measured data. Perhaps the most urgent task is to find a reliable method of assessing lag and that would involve a mixture of distance measurement and pattern finding, which in this project has been found to be a difficult combination. Indeed the choice in this project favoured the measurement of distance but it remains to be discovered a system that could marry both approaches. Nonetheless, the technique used to measure and correct lag of continuous ratings of perceived emotions showed to be successful and perhaps a similar approach could be investigated towards similarity of binary data by applying time-series analysis transforming the binary sequence into a discrete signal and then applying a measure of correlation, as previous work has done (see Schreiber, 2003).

Although the main aim of this study was to focus on measurement techniques, still some observations can be made. The results of experiments 1 and 3 support the idea of the aural-mimetical continuum (see Section 2.3). While in experiment 1 participants described spectromorphological features but outliers described sources, in experiment 3 they were mostly able to describe a source while outliers described acoustical features. This suggest that the focus on either is a choice taken by the listener. Also these experiments corroborate the influence of personal experience, including environmental influence such as culture and experience, by the fact that participants spontaneously built narratives upon their responses. This further suggests that the stimulus acts as a trigger of individual meaning from a more general meaning and that sounds do not contain a universal meaning in themselves which is, as discussed in previous chapters, perhaps the greatest virtue of audio material to compose electroacoustic music. However, the fact that from results obtained in Experiment 2 It was not possible to establish if participants were segmenting to acoustical features or to recognised sound sources, indicates that further improvement shall be done to the design of the experiment. A possible solution could be to prepare a stimulus with sounds having similar spectral qualities. Such approach would greatly benefit with the application of spectromorphological descriptions (see Smalley, 1997) that could be assessed either by a panel of participants, computed from acoustical features or a mix of both. Another approach could be to dissolve the clear boundaries by applying cross-fading, convolution, spatial movement or other techniques of audio morphing. A third major approach would be to exploit the contrast of two auditory streams. In its simplest form this could be just two different concatenated stimuli as the one used in experiments 2 and 4.

As it has been shown, one of the principal limitations of the continuous self-report measurement is the temporal resolution. Other important finding on the measurement technique is that is proper to pay special attention to the particularities of the beginning and end of a continuous measurement sequence. At the beginning of a sequence there is a sort of inertia that has to be overcome from the initial position to the desired rating. At the ending of a sequence there is loss of data and artifacts produced by filtering and cross-correlation delay. These limitations can be counteracted by simply disregarding the measures at the limits. In the case of the issues at the ending of a sequence, a smoothing technique can be applied as well as it was done in Experiment 4, but this might be advisable to do only when it is not possible to disregard that part.

While not being conclusive in its observations, this study has proposed techniques to study the perception and cognition of Electroacoustic Music, which can be extrapolated to the study of other kinds of acoustic stimuli. The tools and techniques presented in this document enable to continue the investigation in the three perceptual aspects studied. Further investigation of them will benefit with the use of different kinds of stimuli and a greater amount of participants than what has been used in the present study. Although self-report measurement is aimed to obtain an insight of high-level representations of the perceptual mechanisms being observed, for the continuous measurement of perceived emotions it could be used in conjunction with more accurate techniques of assessing induced emotions, such as physiological measurements (see Hodges, 2010) or measurements of brain activity (see Koelsch, 2010) and their correspondence with perceived emotions.

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Appendices

A VISUAURAL SOURCE CODE

A simple way to run this code is to copy it to an unformatted text file, change the extension of the file to .pd and then open it in Pure Data extended.

```
#N canvas 4 22 354 923 10;
#X declare -lib mrpeach;
#N canvas 21 22 536 918 engines 0;
#X obj 348 0 cnv 15 170 900 empty empty empty 20 12 0 14 -229361 -66577
0;
#X obj 1 1 cnv 10 340 900 empty empty empty 12 26 0 20 -1 -13381 0
;
#X obj 3 4 cnv 25 336 894 empty empty VisuAuraL 112 40 0 22 -245760
-1 0;
#X obj 192 175 entry 30 20 white black;
#X obj 162 175 entry 20 20 white black;
#X obj 306 299 entry 20 20 white black;
#X text 19 300 3) input number of participant within this day;
#X obj 3 157 cnv 2 336 2 empty empty empty 20 12 0 14 -1 -66577 0;
#X obj 3 218 cnv 2 336 2 empty empty empty 20 12 0 14 -191407 -66577
0;
#X obj 3 278 cnv 2 336 2 empty empty empty 20 12 0 14 -191407 -66577
0;
#X obj 3 398 cnv 2 336 2 empty empty empty 20 12 0 14 -191407 -66577
0;
#X obj 3 633 cnv 2 336 2 empty empty empty 20 12 0 14 -191407 -66577
0;
#X obj 3 694 cnv 2 336 2 empty empty empty 20 12 0 14 -1 -66577 0;
#X obj 200 656 bng 16 250 50 0 \$0-clrp \$0-restartfrom3 empty 17 7
0 10 -260097 -1 -1;
#X obj 3 338 cnv 2 336 2 empty empty empty 20 12 0 14 -191407 -66577
0;
#X obj 222 360 bng 16 250 50 0 \$0-setready \$0-nono empty 17 7 0 10
-4034 -1 -1;
#X text 19 360 4) click to set the system ready;
#X text 19 420 5) press wiimote’s button A or spacebar to start;
#X obj 20 506 cnv 15 304 66 empty empty empty 20 12 0 14 -191407 -66577
0;
#X obj 22 508 cnv 20 300 62 empty empty real_time_data 110 8 0 10 -1
-261682 0;
#X obj 132 175 entry 20 20 white black;
#X text 131 196 day;
#X text 156 196 month;
#X text 194 196 year;
#X obj 359 363 s \$0-partic;
#X obj 359 133 r \$0-datatrig;
#N canvas 1080 357 574 650 setready 0;
#X obj 130 315 s \$0-dispcurr;
#N canvas 1312 371 135 177 alternator 0;
#X obj -33 -66 inlet start/stop;
#X obj -33 -5 tgl 15 0 empty empty empty 17 7 0 10 -262144 -1 -1 0
1;
#X obj -33 56 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144 -1
-1;
#X obj -33 25 route 1 0;
#X obj 36 56 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144 -1
-1;
#X obj -33 86 outlet;
#X obj 36 86 outlet;
#X obj -33 -36 metro 250;
#X connect 0 0 7 0;
#X connect 1 0 3 0;
#X connect 2 0 5 0;
#X connect 3 0 2 0;
#X connect 3 1 4 0;
#X connect 4 0 6 0;
#X connect 7 0 1 0;
#X restore 130 225 pd alternator;
#X msg 130 185 0;
#X msg 169 185 1;
#X obj 207 18 r \$0-year;
#X obj 207 -12 r \$0-month;
#X obj 197 -42 r \$0-day;
#X obj 207 47 r \$0-partic;
#X msg 205 255 date_or_participant_number_missing;
#X obj 103 -12 r \$0-setready;
#X obj -1 46 s \$0-datatrig;
#X obj 205 285 symbol;
#X msg 130 285 symbol;
#X obj 70 185 spigot;
#X msg 66 117 0;
#X msg 103 117 1;
#X obj 103 18 t b b;
#X obj 19 155 delay 250;
#X obj 182 455 qlist;
#X msg 127 415 rewind;
#X obj -10 286 bng 15 250 50 0 empty empty empty 20 7 0 10 -262144
-1 -1;
#X msg 127 545 0;
#X obj 182 485 moses 1;
#X msg 27 545 1;
```

```
#X obj -10 -42 r \$0-setready_bng;
#X obj 189 155 r loadbang;
#X obj 254 455 r \$0-endcount;
#X obj 254 485 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144
-1 -1;
#X obj 27 459 s \$0-setnormal;
#X obj 145 515 r \$0-clrp;
#X obj 61 255 r \$0-clrp;
#X obj 27 575 s \$0-btnAact;
#X obj 169 77 route bang;
#X obj 33 489 r \$0-setready;
#X obj 221 545 - 1;
#X obj 254 545 int;
#X obj 127 575 s \$0-icounter;
#X obj 131 345 t b b b b;
#X obj 34 345 r \$0-next;
#X msg 61 415 next;
#X obj 315 18 s \$0-dispval;
#X msg 285 -12 0;
#X obj 285 -42 r \$0-clrp;
#X obj 285 108 s \$0-disptime;
#X obj 309 48 s \$0-tglwii_y;
#X msg 182 415 read \$1;
#X msg 297 345 set symbol \$1;
#X obj 222 315 r loadbang;
#X msg 182 385 symbol /Users/juigmend/Desktop/Experiment 3/Experiment_3_Data_Recording/program_mmt_exp_3_TEST.vap
;
#X msg 222 345 set;
#N canvas 1119 236 200 163 path_n_file 0;
#X obj 8 7 r \$0-openpanel_load_prg;
#X obj 8 37 openpanel;
#X obj 18 67 splitfilename;
#X obj 18 98 s \$0-prg_path;
#X obj 8 128 outlet;
#X obj 112 98 s \$0-progname;
#X connect 0 0 1 0;
#X connect 1 0 2 0;
#X connect 1 0 4 0;
#X connect 2 0 3 0;
#X connect 2 1 5 0;
#X restore 297 315 pd path_n_file;
#X obj 407 345 r \$0-clrp;
#X obj 189 125 r \$0-clrp;
#X obj 289 139 key;
#X obj 289 169 route 27;
#X obj 289 199 s \$0-restartfrom3;
#X obj 412 78 s \$0-clrp;
#X obj 412 18 key;
#X obj 412 48 route 27;
#X connect 1 0 12 0;
#X connect 1 1 8 0;
#X connect 2 0 1 0;
#X connect 3 0 1 0;
#X connect 4 0 32 0;
#X connect 5 0 32 0;
#X connect 6 0 32 0;
#X connect 7 0 32 0;
#X connect 8 0 11 0;
#X connect 9 0 16 0;
#X connect 11 0 0 0;
#X connect 12 0 0 0;
#X connect 13 0 20 0;
#X connect 14 0 13 1;
#X connect 15 0 13 1;
#X connect 16 0 15 0;
#X connect 16 0 10 0;
#X connect 16 0 17 0;
#X connect 16 1 2 0;
#X connect 17 0 13 0;
#X connect 18 0 22 0;
#X connect 19 0 18 0;
#X connect 19 0 21 0;
#X connect 20 0 23 0;
#X connect 20 0 28 0;
#X connect 20 0 2 0;
#X connect 20 0 37 0;
#X connect 21 0 36 0;
#X connect 22 1 34 0;
#X connect 22 1 35 1;
#X connect 23 0 31 0;
#X connect 24 0 20 0;
#X connect 25 0 2 0;
#X connect 26 0 27 0;
#X connect 27 0 35 0;
#X connect 29 0 21 0;
#X connect 30 0 12 0;
#X connect 32 0 3 0;
#X connect 32 0 14 0;
#X connect 33 0 21 0;
#X connect 34 0 36 0;
#X connect 35 0 36 0;
#X connect 37 0 39 0;
#X connect 37 1 39 0;
#X connect 37 2 19 0;
#X connect 37 3 48 0;
#X connect 38 0 39 0;
#X connect 39 0 18 0;
#X connect 41 0 40 0;
#X connect 41 0 43 0;
#X connect 41 0 44 0;
#X connect 42 0 41 0;
#X connect 45 0 18 0;
#X connect 46 0 48 0;
#X connect 47 0 49 0;
#X connect 48 0 45 0;
#X connect 49 0 48 0;
#X connect 50 0 46 0;
#X connect 51 0 48 0;
#X connect 52 0 2 0;
#X connect 53 0 54 0;
#X connect 54 0 55 0;
#X connect 57 0 58 0;
#X connect 58 0 56 0;
#X restore 359 193 pd setready;
#X text 19 180 1) enter the date;
#N canvas 1019 264 215 507 startup 0;
#X obj 64 374 s \$0-dispcurr;
#X obj 64 125 s loadbang;
#X obj 84 255 s \$0-icounter;
```

```
#X msg 64 195 0;
#X msg 64 345 symbol;
#X obj 83 315 r setready;
#X obj 34 404 outlet loadbang;
#X obj 64 95 import mrpeach;
#X obj 96 226 s \$0-btnAact;
#X msg 64 155 \; pd dsp 1;
#X obj 4 5 loadbang;
#X obj 64 65 s \$0-oscport_def;
#X msg 64 35 5600;
#X obj 64 285 s \$0-wii_y_test_r;
#X obj 4 464 s \$0-progname;
#X msg 4 434 set <--_click_to_load_a_program;
#X connect 3 0 2 0;
#X connect 3 0 8 0;
#X connect 3 0 13 0;
#X connect 4 0 0 0;
#X connect 5 0 4 0;
#X connect 10 0 9 0;
#X connect 10 0 1 0;
#X connect 10 0 7 0;
#X connect 10 0 3 0;
#X connect 10 0 4 0;
#X connect 10 0 6 0;
#X connect 10 0 12 0;
#X connect 10 0 15 0;
#X connect 12 0 11 0;
#X connect 15 0 14 0;
#X restore 359 73 pd startup;
#N canvas 700 422 229 62 day_month_year_hub 0;
#X obj -230 -14 s \$0-day;
#X obj -161 -14 s \$0-month;
#X obj -80 -14 s \$0-year;
#X obj -80 -44 inlet year;
#X obj -161 -44 inlet month;
#X obj -230 -44 inlet day;
#X connect 3 0 2 0;
#X connect 4 0 1 0;
#X connect 5 0 0 0;
#X restore 359 242 pd day_month_year_hub;
#N canvas 696 659 278 186 set_partic 0;
#X obj -1 50 symbol;
#X msg -106 20 normal;
#X msg -1 20 disabled;
#X msg -1 80 option state \$1;
#X obj -175 -40 r \$0-clrp;
#X msg -175 60 clear;
#X obj -175 110 outlet to participant number input;
#X obj -106 -40 r loadbang;
#X obj -175 -10 t b b;
#X obj -96 -10 r \$0-setready;
#X obj -1 -40 r \$0-setnormal;
#X connect 0 0 3 0;
#X connect 1 0 0 0;
#X connect 2 0 0 0;
#X connect 3 0 6 0;
#X connect 4 0 8 0;
#X connect 5 0 6 0;
#X connect 7 0 1 0;
#X connect 7 0 5 0;
#X connect 8 0 5 0;
#X connect 8 1 1 0;
#X connect 9 0 1 0;
#X connect 10 0 2 0;
#X restore 359 333 pd set_partic;
#N canvas 637 505 208 154 set_date 0;
#X obj 4 50 symbol;
#X msg -85 20 normal;
#X msg 4 20 disabled;
#X msg 4 80 option state \$1;
#X msg -95 60 clear;
#X obj -95 110 outlet day month year;
#X obj -95 -10 inlet loadbang;
#X obj 4 -10 r \$0-setready;
#X connect 0 0 3 0;
#X connect 1 0 0 0;
#X connect 2 0 0 0;
#X connect 3 0 5 0;
#X connect 4 0 5 0;
#X connect 6 0 1 0;
#X connect 6 0 4 0;
#X connect 7 0 2 0;
#X restore 359 103 pd set_date;
#X text 352 682 -------------------------;
#X text 351 401 -------------------------;
#X text 352 36 -------------------------;
#X text 352 580 -------------------------;
#X text 352 590 VISUAL DISPLAY;
#N canvas 567 409 165 489 program_engines 0;
#N canvas 659 307 265 469 prog_end 0;
#X msg 76 -180 0;
#X obj 16 125 s \$0-dispcurr;
#X obj 16 -29 r \$0-partic;
#X obj 16 1 spigot;
#X msg 109 -29 1;
#X msg 176 -29 0;
#X obj 186 -63 r loadbang;
#X obj 16 -240 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144
-1 -1;
#X obj 16 -179 delay 50;
#X msg 16 31 set Participant_\$1_END;
#X obj 36 91 delay 100;
#X obj 36 61 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144 -1
-1;
#X obj 136 -180 s \$0-endcount;
#X obj 76 -150 s \$0-btnAact;
#X obj 16 -300 r prog_end;
#X obj 176 -149 r \$0-next;
#X msg 109 -119 1;
#X msg 176 -119 0;
#X obj 16 -89 spigot;
#X obj 16 -59 s \$0-datatrig;
#X obj 16 -149 t b b;
#X obj 136 -210 s \$0-restartfrom3;
#X obj 16 -270 route end restart;
#X obj 136 -242 delay 5000;
#X connect 0 0 13 0;
#X connect 2 0 3 0;
#X connect 3 0 9 0;
```

```
#X connect 4 0 3 1;
#X connect 5 0 3 1;
#X connect 6 0 5 0;
#X connect 7 0 8 0;
#X connect 7 0 0 0;
#X connect 7 0 12 0;
#X connect 8 0 20 0;
#X connect 9 0 11 0;
#X connect 9 0 1 0;
#X connect 10 0 1 0;
#X connect 11 0 10 0;
#X connect 11 0 5 0;
#X connect 14 0 22 0;
#X connect 15 0 17 0;
#X connect 16 0 4 0;
#X connect 16 0 18 1;
#X connect 17 0 5 0;
#X connect 17 0 18 1;
#X connect 18 0 19 0;
#X connect 20 0 18 0;
#X connect 20 1 16 0;
#X connect 22 0 7 0;
#X connect 22 1 7 0;
#X connect 22 1 23 0;
#X connect 23 0 21 0;
#X restore 11 188 pd prog_end;
#N canvas 617 180 196 327 prog_ready 0;
#X obj 9 64 s \$0-dispcurr;
#X msg -75 -86 READY;
#X obj -57 -116 t b a;
#X obj -57 -174 symbol;
#X obj -75 34 symbol;
#X symbolatom -57 -144 10 0 0 0 - - -;
#X obj 26 -84 r \$0-year;
#X obj 26 -114 r \$0-month;
#X obj 26 -144 r \$0-day;
#X msg -75 4 \$1_\$2_\$3/\$4/\$5_p\$6;
#X obj 26 -55 r \$0-partic;
#X obj -84 64 s \$0-datatrig;
#X obj -84 -174 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144
-1 -1;
#X obj -75 -26 pack s s f f f f;
#X obj -84 -204 r prog_ready;
#X connect 1 0 13 0;
#X connect 2 0 1 0;
#X connect 2 1 13 1;
#X connect 3 0 5 0;
#X connect 4 0 0 0;
#X connect 5 0 2 0;
#X connect 6 0 13 4;
#X connect 7 0 13 3;
#X connect 8 0 13 2;
#X connect 9 0 4 0;
#X connect 10 0 13 5;
#X connect 12 0 11 0;
#X connect 13 0 9 0;
#X connect 14 0 12 0;
#X connect 14 0 3 0;
#X restore 11 -262 pd prog_ready;
#N canvas 362 25 377 428 v_txt_qst 0;
#X msg -250 158 0;
#X obj -250 208 s \$0-btnAact;
#X obj -240 67 pack s;
#X obj -240 98 s \$0-dispcurr;
#X obj -130 -2 s \$0-make_file_name;
#X obj 16 28 s \$0-tglnum;
#X msg -41 98 0;
#X obj -41 128 s \$0-tglnum;
#X obj -110 328 s \$0-next;
#X obj -250 -62 r v_txt_qst;
#X obj -212 -2 s \$0-txt_qst;
#X msg 16 -2 0;
#X obj -83 298 s \$0-openclose_txt_qst_screen;
#X msg -83 268 0;
#X obj -110 98 delay 1000;
#X obj -110 128 t b b;
#X obj -80 68 bang;
#X obj -80 28 r snd-contbtn;
#X msg -220 158 1;
#X obj -220 128 r \$0-q_contaspace;
#X obj 3 159 r \$0-q_contaspace;
#X msg 43 219 0;
#X obj -30 249 spigot;
#X msg 3 219 1;
#X obj 43 189 r \$0-txt_qst;
#X obj -57 158 r \$0-next;
#X obj -57 188 t b b;
#X obj -212 28 r \$0-txt_qst_flcont;
#X connect 0 0 1 0;
#X connect 2 0 3 0;
#X connect 6 0 7 0;
#X connect 9 0 0 0;
#X connect 9 0 2 0;
#X connect 9 0 4 0;
#X connect 9 0 11 0;
#X connect 9 0 10 0;
#X connect 11 0 5 0;
#X connect 13 0 12 0;
#X connect 14 0 15 0;
#X connect 15 0 8 0;
#X connect 15 1 13 0;
#X connect 16 0 14 0;
#X connect 16 0 6 0;
#X connect 17 0 16 0;
#X connect 18 0 1 0;
#X connect 19 0 18 0;
#X connect 20 0 23 0;
#X connect 21 0 22 1;
#X connect 22 0 13 0;
#X connect 23 0 22 1;
#X connect 24 0 21 0;
#X connect 25 0 26 0;
#X connect 26 0 21 0;
#X connect 26 1 22 0;
#X connect 27 0 16 0;
#X restore 11 158 pd v_txt_qst;
#N canvas 852 22 391 215 v_disptxt 0;
#X msg -197 86 0;
#X obj -73 116 s \$0-next;
```

```
#X obj -197 116 s \$0-btnAact;
#X obj 20 -64 r v_disptxt;
#X obj -288 116 s \$0-disptxt;
#X obj -288 15 pack s;
#X obj -288 46 s \$0-dispcurr;
#X obj -73 56 r \$0-disptxt_done;
#X connect 0 0 2 0;
#X connect 3 0 0 0;
#X connect 3 0 5 0;
#X connect 3 0 4 0;
#X connect 5 0 6 0;
#X connect 7 0 1 0;
#X restore 11 38 pd v_disptxt;
#N canvas 671 510 451 287 a_repinst 0;
#X obj -349 106 s \$0-dispcurr;
#X obj -349 76 pack s;
#X obj -349 156 s \$0-playfile;
#X obj -111 186 delay 5000;
#X msg -235 236 0;
#X obj -111 268 s \$0-next;
#X msg -205 236 2;
#X obj -111 237 spigot;
#X msg 1 186 0;
#X msg -36 186 1;
#X obj 1 156 r \$0-playfile;
#X obj -111 96 r \$0-playdone;
#X obj -111 126 spigot;
#X msg -18 96 1;
#X msg 25 96 0;
#X obj 25 66 r \$0-next;
#X obj -48 66 delay 50;
#X obj -48 36 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144 -1
-1;
#X obj -235 6 r \$0-rep_inst;
#X obj -349 35 s \$0-playfile_bng;
#X msg -205 126 stop;
#X obj -235 266 s \$0-btnAact;
#X obj -48 6 r a_repinst;
#X connect 1 0 0 0;
#X connect 3 0 7 0;
#X connect 4 0 21 0;
#X connect 6 0 21 0;
#X connect 7 0 5 0;
#X connect 8 0 7 1;
#X connect 9 0 7 1;
#X connect 10 0 8 0;
#X connect 11 0 12 0;
#X connect 12 0 3 0;
#X connect 12 0 6 0;
#X connect 12 0 9 0;
#X connect 13 0 12 1;
#X connect 14 0 12 1;
#X connect 15 0 14 0;
#X connect 16 0 13 0;
#X connect 17 0 16 0;
#X connect 18 0 19 0;
#X connect 18 0 17 0;
#X connect 18 0 4 0;
#X connect 18 0 20 0;
#X connect 20 0 3 0;
#X connect 22 0 1 0;
#X connect 22 0 4 0;
#X connect 22 0 2 0;
#X connect 22 0 17 0;
#X restore 11 -232 pd a_repinst;
#N canvas 640 537 474 223 a_inst_nxt 0;
#X obj -369 -19 s \$0-dispcurr;
#X obj -369 -49 pack s;
#X obj -346 21 s \$0-playfile;
#X msg -245 51 0;
#X msg -215 51 1;
#X obj -121 -9 r \$0-playdone;
#X obj -121 21 spigot;
#X msg -28 -9 1;
#X msg 35 -9 0;
#X obj 35 -39 r \$0-next;
#X obj -28 -39 delay 50;
#X obj -28 -69 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144
-1 -1;
#X obj -245 81 s \$0-btnAact;
#X obj -28 -99 r a_inst_nxt;
#X connect 1 0 0 0;
#X connect 3 0 12 0;
#X connect 4 0 12 0;
#X connect 5 0 6 0;
#X connect 6 0 4 0;
#X connect 7 0 6 1;
#X connect 8 0 6 1;
#X connect 9 0 8 0;
#X connect 10 0 7 0;
#X connect 11 0 10 0;
#X connect 13 0 1 0;
#X connect 13 0 2 0;
#X connect 13 0 3 0;
#X connect 13 0 11 0;
#X restore 11 -202 pd a_inst_nxt;
#N canvas 753 469 462 274 a_restartopt 0;
#X obj -353 -36 s \$0-dispcurr;
#X obj -353 -66 pack s;
#X obj -330 4 s \$0-playfile;
#X obj -115 42 delay 5000;
#X msg -239 34 0;
#X obj -115 124 s \$0-next;
#X obj -115 93 spigot;
#X msg -3 42 0;
#X msg -40 42 1;
#X obj -3 4 r \$0-playfile;
#X obj -115 -26 r \$0-playdone;
#X obj -115 4 spigot;
#X msg -22 -26 1;
#X msg 41 -26 0;
#X obj 41 -56 r \$0-next;
#X msg -209 34 3;
#X obj -22 -56 delay 50;
#X obj -22 -85 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144
-1 -1;
#X obj -239 64 s \$0-btnAact;
#X obj -22 -116 r a_restartopt;
#X connect 1 0 0 0;
```

```
#X connect 3 0 6 0;
#X connect 4 0 18 0;
#X connect 6 0 5 0;
#X connect 7 0 6 1;
#X connect 8 0 6 1;
#X connect 9 0 7 0;
#X connect 10 0 11 0;
#X connect 11 0 3 0;
#X connect 11 0 15 0;
#X connect 11 0 8 0;
#X connect 12 0 11 1;
#X connect 13 0 11 1;
#X connect 14 0 13 0;
#X connect 15 0 18 0;
#X connect 16 0 12 0;
#X connect 17 0 16 0;
#X connect 19 0 1 0;
#X connect 19 0 2 0;
#X connect 19 0 4 0;
#X connect 19 0 17 0;
#X restore 11 -112 pd a_restartopt;
#N canvas 628 316 281 556 a_datacap_rt_nom 0;
#X obj 13 -37 s \$0-dispcurr;
#X obj 13 -67 pack s;
#X obj -2 -7 s \$0-playfile;
#X obj -2 231 s \$0-next;
#X obj -2 201 spigot;
#X msg 110 171 0;
#X msg 73 171 1;
#X obj 110 143 r \$0-playfile;
#X obj -2 23 r \$0-playdone;
#X obj -2 103 spigot;
#X msg 91 23 1;
#X msg 128 23 0;
#X msg 28 -137 4;
#X obj -2 171 delay 3000;
#X obj 110 83 spigot;
#X obj 165 23 r \$0-playsync;
#X msg 8 53 0;
#X obj 28 -107 s \$0-btnAact;
#X obj 110 113 s \$0-tglrtdatacap;
#X obj 128 -7 r \$0-next;
#X obj 43 -167 s \$0-make_file_name;
#X obj 58 -197 s \$0-reset_rtd;
#X obj -2 -297 r a_datacap_rt_nom;
#X obj -2 -267 t a a b a b b;
#X obj 183 -197 delay;
#X connect 1 0 0 0;
#X connect 4 0 3 0;
#X connect 5 0 4 1;
#X connect 6 0 4 1;
#X connect 7 0 5 0;
#X connect 8 0 9 0;
#X connect 8 0 16 0;
#X connect 9 0 6 0;
#X connect 9 0 13 0;
#X connect 10 0 9 1;
#X connect 10 0 14 1;
#X connect 11 0 9 1;
#X connect 11 0 14 1;
#X connect 12 0 17 0;
#X connect 13 0 4 0;
#X connect 14 0 18 0;
#X connect 15 0 14 0;
#X connect 16 0 14 0;
#X connect 19 0 11 0;
#X connect 22 0 23 0;
#X connect 23 0 2 0;
#X connect 23 1 1 0;
#X connect 23 2 12 0;
#X connect 23 3 20 0;
#X connect 23 4 21 0;
#X connect 23 5 24 0;
#X connect 24 0 10 0;
#X restore 11 -82 pd a_datacap_rt_nom;
#N canvas 806 182 445 511 a_datacap_qstn 0;
#X obj 7 -110 s \$0-dispcurr;
#X obj 7 -140 pack s;
#X obj -161 -150 s \$0-playfile;
#X obj -141 70 r \$0-playdone;
#X msg -48 70 1;
#X msg 72 100 0;
#X obj 72 70 r \$0-next;
#X obj -141 230 spigot;
#X obj -48 -70 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144
-1 -1;
#X obj -48 10 delay 50;
#X msg -141 -100 0;
#X obj -141 -70 s \$0-btnAact;
#X msg -141 100 1;
#X obj 60 291 s \$0-tglnum;
#X obj 60 261 spigot;
#X obj 72 181 t f f;
#X obj -9 261 gate;
#X msg -9 70 0;
#X obj 54 10 r \$0-numbers;
#X obj -9 291 s \$0-next;
#X obj -307 291 s \$0-tglseqdatacap;
#X obj -162 261 gate;
#X msg -307 51 0;
#X obj -215 121 cup;
#X msg -176 181 0;
#X obj -264 81 t b f;
#X obj -307 144 spigot;
#X msg -254 121 1;
#X msg -294 121 0;
#X msg -215 181 1;
#X obj -267 30 r \$0-setready;
#X obj -215 151 moses 2;
#X obj 12 -20 s \$0-make_file_name;
#X obj 7 -180 r a_datacap_qstn;
#X obj -297 -180 r a_repinst;
#X obj -287 -150 r a_inst_nxt;
#X obj -277 -120 r a_play;
#X obj -267 -90 r a_restartopt;
#X obj -267 -60 r a_datacap_rt_nom;
#X obj -267 0 r prog_end;
#X obj -267 -30 r a_rec_qstn;
#X connect 1 0 0 0;
```

```
#X connect 3 0 12 0;
#X connect 4 0 7 1;
#X connect 4 0 15 0;
#X connect 5 0 7 1;
#X connect 5 0 15 0;
#X connect 6 0 5 0;
#X connect 7 0 21 1;
#X connect 8 0 9 0;
#X connect 8 0 23 0;
#X connect 8 0 27 0;
#X connect 8 0 32 0;
#X connect 9 0 4 0;
#X connect 9 0 17 0;
#X connect 10 0 11 0;
#X connect 12 0 14 0;
#X connect 12 0 16 0;
#X connect 12 0 7 0;
#X connect 14 0 13 0;
#X connect 15 0 14 1;
#X connect 15 1 14 0;
#X connect 16 0 19 0;
#X connect 17 0 16 0;
#X connect 18 0 16 1;
#X connect 21 0 20 0;
#X connect 22 0 25 0;
#X connect 22 0 26 0;
#X connect 23 0 31 0;
#X connect 24 0 21 0;
#X connect 25 0 23 0;
#X connect 25 1 23 0;
#X connect 26 0 28 0;
#X connect 26 0 20 0;
#X connect 27 0 26 1;
#X connect 28 0 26 1;
#X connect 29 0 21 0;
#X connect 30 0 22 0;
#X connect 31 0 29 0;
#X connect 31 1 24 0;
#X connect 33 0 1 0;
#X connect 33 0 2 0;
#X connect 33 0 10 0;
#X connect 33 0 8 0;
#X connect 34 0 22 0;
#X connect 35 0 22 0;
#X connect 36 0 22 0;
#X connect 37 0 22 0;
#X connect 38 0 22 0;
#X connect 39 0 22 0;
#X connect 40 0 22 0;
#X restore 11 8 pd a_datacap_qstn;
#N canvas 1345 43 373 317 v_datacap_stroop 0;
#X msg -260 186 0;
#X obj -260 216 s \$0-btnAact;
#X obj -240 125 pack s;
#X obj -240 156 s \$0-dispcurr;
#X obj -120 26 r \$0-stroop_done;
#X obj -220 -4 s \$0-stroop;
#X obj -260 -64 r v_datacap_stroop;
#X obj -14 126 s \$0-tglseqdatacap;
#X obj -138 -4 s \$0-make_file_name;
#X obj -140 186 s \$0-dispval;
#X msg -150 156 0;
#X obj -120 126 delay 1000;
#X obj 6 -4 s \$0-tglnum;
#X msg -14 -34 1;
#X obj -150 216 s \$0-disptime;
#X obj -120 66 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144
-1 -1;
#N canvas 634 48 362 203 display_spigots 0;
#X msg 59 79 1;
#X obj -14 145 s \$0-dispval;
#X obj -14 115 spigot;
#X msg 19 49 0;
#X msg 289 79 1;
#X obj 216 115 spigot;
#X msg 249 49 0;
#X obj 216 145 s \$0-disptime;
#X obj 216 -10 r \$0-stroop_time;
#X obj 104 10 r \$0-stroop_done;
#X obj 104 50 r v_datacap_stroop;
#X obj -14 -10 r \$0-numbers;
#X connect 0 0 2 1;
#X connect 2 0 1 0;
#X connect 3 0 2 1;
#X connect 4 0 5 1;
#X connect 5 0 7 0;
#X connect 6 0 5 1;
#X connect 8 0 5 0;
#X connect 9 0 3 0;
#X connect 9 0 6 0;
#X connect 10 0 0 0;
#X connect 10 0 4 0;
#X connect 11 0 2 0;
#X restore -14 216 pd display_spigots;
#X msg -51 96 0;
#X obj -51 156 s \$0-tglnum;
#X obj -120 156 s \$0-next;
#X connect 0 0 1 0;
#X connect 2 0 3 0;
#X connect 4 0 15 0;
#X connect 6 0 0 0;
#X connect 6 0 2 0;
#X connect 6 0 8 0;
#X connect 6 0 13 0;
#X connect 6 0 10 0;
#X connect 6 0 5 0;
#X connect 10 0 9 0;
#X connect 10 0 14 0;
#X connect 11 0 10 0;
#X connect 11 0 19 0;
#X connect 13 0 12 0;
#X connect 13 0 7 0;
#X connect 15 0 17 0;
#X connect 15 0 11 0;
#X connect 17 0 7 0;
#X connect 17 0 18 0;
#X restore 11 128 pd v_datacap_stroop;
#N canvas 711 417 421 263 a_rec_qstn 0;
#X obj -316 -58 s \$0-dispcurr;
```

```
#X obj -316 -88 pack s;
#X obj -293 -18 s \$0-playfile;
#X msg -282 52 0;
#X msg -252 52 1;
#X obj -118 -48 r \$0-playdone;
#X obj -118 -18 spigot;
#X msg -25 -48 1;
#X msg 38 -48 0;
#X obj 38 -78 r \$0-next;
#X obj -118 12 s \$0-startaudiorec;
#X obj -25 -108 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144
-1 -1;
#X obj -25 -78 delay 50;
#X obj -193 12 delay 1000;
#X obj -282 82 s \$0-btnAact;
#X obj -25 -138 r a_rec_qstn;
#X connect 1 0 0 0;
#X connect 3 0 14 0;
#X connect 4 0 14 0;
#X connect 5 0 6 0;
#X connect 6 0 10 0;
#X connect 6 0 13 0;
#X connect 7 0 6 1;
#X connect 8 0 6 1;
#X connect 9 0 8 0;
#X connect 11 0 12 0;
#X connect 12 0 7 0;
#X connect 13 0 4 0;
#X connect 15 0 1 0;
#X connect 15 0 2 0;
#X connect 15 0 3 0;
#X connect 15 0 11 0;
#X restore 11 -22 pd a_rec_qstn;
#N canvas 810 203 292 343 wait 0;
#X obj -180 -4 s \$0-dispcurr;
#X msg -180 76 0;
#X obj -180 106 s \$0-btnAact;
#X obj -180 -64 l2s;
#X msg -180 -34 set waiting_\$1_seconds;
#X obj 44 166 select;
#X msg 10 46 1;
#X obj 10 86 metro 1000;
#X obj 10 116 cup;
#X obj 50 -4 t f f;
#X msg -93 86 -1;
#X obj 50 -84 r wait;
#X obj 10 206 s \$0-disptime;
#X msg -83 176 0;
#X obj -83 116 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144
-1 -1;
#X obj -83 146 delay 1000;
#X obj -29 -4 r \$0-clrp;
#X msg -93 46 0;
#X msg -30 86 -1;
#X obj 10 166 + 1;
#X obj -93 236 s \$0-next;
#X obj -93 206 delay;
#X connect 1 0 2 0;
#X connect 3 0 4 0;
#X connect 4 0 0 0;
#X connect 5 0 17 0;
#X connect 6 0 7 0;
#X connect 7 0 8 0;
#X connect 8 0 5 0;
#X connect 8 0 19 0;
#X connect 9 0 6 0;
#X connect 9 1 5 1;
#X connect 10 0 14 0;
#X connect 10 0 21 0;
#X connect 11 0 1 0;
#X connect 11 0 3 0;
#X connect 11 0 9 0;
#X connect 13 0 12 0;
#X connect 14 0 15 0;
#X connect 15 0 13 0;
#X connect 16 0 17 0;
#X connect 17 0 7 0;
#X connect 17 0 10 0;
#X connect 17 0 18 0;
#X connect 18 0 8 0;
#X connect 19 0 12 0;
#X connect 21 0 20 0;
#X restore 11 98 pd wait;
#N canvas 791 55 394 562 a_datacap_rt_wii_y 0;
#X obj -105 -165 s \$0-dispcurr;
#X obj -105 -195 pack s;
#X obj -119 -135 s \$0-playfile;
#X obj -119 103 s \$0-next;
#X obj -119 73 spigot;
#X msg -7 43 0;
#X msg -44 43 1;
#X obj -7 15 r \$0-playfile;
#X obj -119 -105 r \$0-playdone;
#X obj -119 -25 spigot;
#X msg -26 -105 1;
#X msg 11 -105 0;
#X obj -119 43 delay 3000;
#X obj -7 -45 spigot;
#X obj 48 -105 r \$0-playsync;
#X msg -109 -75 0;
#X obj -90 -225 s \$0-btnAact;
#X obj -7 -15 s \$0-tglrtdatacap;
#X obj 11 -135 r \$0-next;
#X obj -76 -285 s \$0-make_file_name;
#X obj -119 -385 r a_datacap_rt_wii_y;
#X msg -90 -255 0;
#X obj 131 143 s \$0-tglwii_y;
#X msg 131 -285 1;
#X msg -149 103 0;
#X obj 131 -315 s \$0-reset_rtd;
#X obj -119 -355 t a a b a b b b;
#X obj 58 -285 delay;
#X connect 1 0 0 0;
#X connect 4 0 3 0;
#X connect 5 0 4 1;
#X connect 6 0 4 1;
#X connect 7 0 5 0;
#X connect 8 0 9 0;
#X connect 8 0 15 0;
```

```
#X connect 9 0 6 0;
#X connect 9 0 12 0;
#X connect 9 0 24 0;
#X connect 10 0 9 1;
#X connect 10 0 13 1;
#X connect 11 0 9 1;
#X connect 11 0 13 1;
#X connect 12 0 4 0;
#X connect 13 0 17 0;
#X connect 14 0 13 0;
#X connect 15 0 13 0;
#X connect 18 0 11 0;
#X connect 20 0 26 0;
#X connect 21 0 16 0;
#X connect 23 0 22 0;
#X connect 24 0 22 0;
#X connect 26 0 2 0;
#X connect 26 1 1 0;
#X connect 26 2 21 0;
#X connect 26 3 19 0;
#X connect 26 4 27 0;
#X connect 26 5 23 0;
#X connect 26 6 25 0;
#X connect 27 0 10 0;
#X restore 11 -51 pd a_datacap_rt_wii_y;
#N canvas 588 555 666 413 a_randomplay 0;
#X obj 106 -28 r a_randomplay;
#N canvas 753 22 216 272 randomplay_engine 0;
#X obj -100 -40 msgfile;
#X obj -100 -130 pack s;
#X obj -61 -10 route float;
#X obj -100 -160 inlet a_randomplay;
#X obj -100 -70 r \$0-to_msgfile_rndplay;
#X obj -61 20 s \$0-totalines_rndplay;
#N canvas 985 22 562 566 randomplay_loader 0;
#X msg -67 170 read \$1;
#X obj -292 -86 inlet file name;
#N canvas 420 618 364 195 add_path_n_filename 0;
#X obj 250 -28 inlet;
#X obj 232 122 outlet;
#X obj 7 -28 r \$0-prg_path;
#X msg 7 32 symbol /Users/juigmend/Desktop/Experiment 3/Experiment_3_Data_Recording
;
#X msg 7 2 set symbol \$1;
#X obj 232 62 pack s s;
#X obj 277 32 l2s;
#X obj 232 92 makesymbol %s/%s;
#X obj 250 2 t a a;
#X obj 107 -28 r loadbang;
#X msg 107 2 set;
#X connect 0 0 8 0;
#X connect 2 0 4 0;
#X connect 3 0 5 0;
#X connect 4 0 3 0;
#X connect 5 0 7 0;
#X connect 6 0 5 1;
#X connect 7 0 1 0;
#X connect 8 0 3 0;
#X connect 8 1 6 0;
#X connect 9 0 10 0;
#X connect 10 0 3 0;
#X restore -292 -60 pd add_path_n_filename;
#X msg 20 20 goto \$1;
#X obj -67 200 t a a;
#X msg -67 -70 this;
#X obj -67 290 s \$0-to_msgfile_rndplay;
#X obj -7 -40 r \$0-rndplay_index;
#X obj -67 50 s \$0-to_msgfile_rndplay;
#X obj -40 230 s \$0-to_msgfile_rndplay;
#X obj -7 -10 t a a;
#X obj -292 390 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144
-1 -1;
#X obj -292 450 s \$0-trig_rndplay;
#X obj -217 390 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144
-1 -1;
#X obj -292 290 t a b;
#X obj -292 360 select symbol;
#X msg -155 20 set symbol \$1;
#X msg -67 130 symbol;
#X msg -205 320 symbol;
#X obj -292 -30 t a a;
#X msg -277 80 set symbol;
#X obj -267 50 loadbang;
#X obj -277 20 r \$0-clrp;
#X obj -217 420 s \$0-rndplay_trigread;
#X obj -67 80 r \$0-rndplay_trigread;
#X msg -205 290 set symbol \$1;
#X msg -67 260 end \, skip -1 \, where;
#X connect 0 0 4 0;
#X connect 1 0 2 0;
#X connect 2 0 19 0;
#X connect 3 0 8 0;
#X connect 4 0 26 0;
#X connect 4 1 9 0;
#X connect 5 0 8 0;
#X connect 7 0 10 0;
#X connect 10 0 5 0;
#X connect 10 1 3 0;
#X connect 11 0 12 0;
#X connect 13 0 23 0;
#X connect 14 0 15 0;
#X connect 14 1 18 0;
#X connect 15 0 11 0;
#X connect 15 1 13 0;
#X connect 16 0 17 0;
#X connect 17 0 25 0;
#X connect 17 0 0 0;
#X connect 18 0 15 1;
#X connect 19 0 14 0;
#X connect 19 1 16 0;
#X connect 20 0 18 0;
#X connect 20 0 17 0;
#X connect 21 0 20 0;
#X connect 22 0 20 0;
#X connect 24 0 17 0;
#X connect 25 0 18 0;
#X connect 26 0 6 0;
#X restore -100 -100 pd randomplay_loader;
#X obj -100 90 outlet filename to play;
```

```
#N canvas 581 534 176 185 rndplay_lines_randomizer 0;
#X obj 23 87 shuffle;
#X msg 75 57 0.15;
#X obj -21 57 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144 -1
-1;
#X obj 8 -4 r \$0-totalines_rndplay;
#X msg 9 57 0;
#X obj 8 27 t f f f f;
#X obj 23 117 s \$0-rndplay_index;
#X obj -21 -34 r \$0-trig_rndplay;
#X connect 0 0 6 0;
#X connect 1 0 0 2;
#X connect 2 0 0 0;
#X connect 3 0 5 0;
#X connect 4 0 0 0;
#X connect 5 0 2 0;
#X connect 5 1 4 0;
#X connect 5 2 0 1;
#X connect 5 3 1 0;
#X connect 7 0 2 0;
#X restore -61 60 pd rndplay_lines_randomizer;
#X connect 0 0 7 0;
#X connect 0 1 2 0;
#X connect 1 0 6 0;
#X connect 2 0 5 0;
#X connect 3 0 1 0;
#X connect 4 0 0 0;
#X restore -57 12 pd randomplay_engine;
#X obj -21 42 s a_simpleplay;
#X obj 146 12 s \$0-make_file_name;
#X msg 106 242 write \$1;
#X symbolatom 106 212 80 0 0 0 - - -;
#X obj 106 122 r \$0-datafilename;
#X msg 106 182 set \$1;
#X obj 106 152 pack s;
#X obj 161 322 s \$0-filecounter;
#X text 273 276 part of "write_n_save_tables";
#X text 273 249 the "save" part of this subpatch;
#X text 106 102 SAVE:;
#X text 273 290 in a new subpatch "make_txt_file";
#X msg -57 182 add \$1;
#X msg 0 182 clear;
#X text 273 263 could be somehow merged with the "save tables";
#X obj 106 272 t b a;
#X obj -57 72 t any bang;
#X obj 13 72 r \$0-playdone;
#X obj 13 102 spigot;
#X msg 106 72 1;
#X msg 169 72 0;
#X obj 226 42 r \$0-next;
#X obj 106 12 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144 -1
-1;
#X obj 106 42 delay 50;
#X msg 226 182 set symbol;
#X obj 133 352 textfile;
#X connect 0 0 1 0;
#X connect 0 0 3 0;
#X connect 0 0 24 0;
#X connect 1 0 2 0;
#X connect 1 0 18 0;
#X connect 4 0 17 0;
#X connect 5 0 4 0;
#X connect 6 0 8 0;
#X connect 7 0 5 0;
#X connect 8 0 7 0;
#X connect 14 0 27 0;
#X connect 15 0 27 0;
#X connect 17 0 9 0;
#X connect 17 1 27 0;
#X connect 18 0 14 0;
#X connect 18 1 15 0;
#X connect 19 0 20 0;
#X connect 20 0 5 0;
#X connect 21 0 20 1;
#X connect 22 0 20 1;
#X connect 23 0 22 0;
#X connect 23 0 26 0;
#X connect 24 0 25 0;
#X connect 25 0 21 0;
#X connect 26 0 5 0;
#X restore 11 -142 pd a_randomplay;
#N canvas 624 660 458 207 a_simpleplay 0;
#X obj -351 -14 s \$0-dispcurr;
#X obj -351 -44 pack s;
#X obj -328 26 s \$0-playfile;
#X msg -237 56 0;
#X obj -113 -4 r \$0-playdone;
#X obj -113 26 spigot;
#X msg -20 -4 1;
#X msg 43 -4 0;
#X obj 43 -34 r \$0-next;
#X obj -113 86 s \$0-next;
#X obj -113 56 delay 3000;
#X obj -20 -64 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144
-1 -1;
#X obj -20 -34 delay 50;
#X obj -237 86 s \$0-btnAact;
#X obj -20 -94 r a_simpleplay;
#X connect 1 0 0 0;
#X connect 3 0 13 0;
#X connect 4 0 5 0;
#X connect 5 0 10 0;
#X connect 6 0 5 1;
#X connect 7 0 5 1;
#X connect 8 0 7 0;
#X connect 10 0 9 0;
#X connect 11 0 12 0;
#X connect 12 0 6 0;
#X connect 14 0 1 0;
#X connect 14 0 2 0;
#X connect 14 0 3 0;
#X connect 14 0 11 0;
#X restore 11 -172 pd a_simpleplay;
#N canvas 557 22 477 533 v_disptxt_count 0;
#X msg 99 -34 0;
#X obj 99 -4 s \$0-btnAact;
#X obj -294 366 pack s;
#X obj -294 426 s \$0-dispcurr;
#X obj -224 -64 r v_disptxt_count;
```

```
#X msg -294 396 set v_disptxt_count__\$1;
#X obj 13 126 cup;
#X obj -224 -34 route show init;
#X obj -86 426 s \$0-txt_colour;
#X obj -137 446 s \$0-txtsize;
#X obj -34 406 s $v_disptxt_count_text1;
#X obj 13 386 s $v_disptxt_count_text2;
#X msg -137 226 set \$1;
#X msg -137 396 4;
#X text -132 207 fsize;
#X msg -86 226 set \$1;
#X msg -86 376 w;
#X text -81 207 col;
#X msg -34 226 set \$1;
#X msg -34 356 Start and Changes (red button) - practice;
#X text -29 207 txt1;
#X msg 13 326 2 of 3;
#X text 18 207 txt2;
#X obj 27 66 r $v_disptxt_count_text2;
#X obj 27 96 bang;
#X msg 18 26 set \$1;
#X obj -181 26 bang;
#X obj -14 96 t b a;
#X obj -86 26 symbol;
#X obj 13 186 pack f f f;
#N canvas 669 22 563 900 disptxt_counter_parameter_loader 0;
#X obj -260 126 bng 15 250 50 0 empty empty next_line 20 8 0 10 -262144
-1 -1;
#X obj -113 186 cup;
#X obj -260 156 t b b;
#X msg -260 66 0;
#X msg -63 6 read \$1;
#X msg -44 86 rewind;
#X obj -63 36 t a a a;
#X obj -63 -54 inlet file name;
#X msg -113 66 -1;
#X msg -23 377 1;
#X msg 16 377 0;
#X msg -113 377 1;
#X msg -68 377 0;
#X obj -23 346 route 0;
#X obj -113 346 route -1;
#N canvas 420 618 364 195 add_path_n_filename 0;
#X obj 250 -28 inlet;
#X obj 232 122 outlet;
#X obj 7 -28 r \$0-prg_path;
#X msg 7 32 symbol /Users/juigmend/Desktop/Experiment 3/Experiment_3_Data_Recording
;
#X msg 7 2 set symbol \$1;
#X obj 232 62 pack s s;
#X obj 277 32 l2s;
#X obj 232 92 makesymbol %s/%s;
#X obj 250 2 t a a;
#X obj 107 -28 r loadbang;
#X msg 107 2 set;
#X connect 0 0 8 0;
#X connect 2 0 4 0;
#X connect 3 0 5 0;
#X connect 4 0 3 0;
#X connect 5 0 7 0;
#X connect 6 0 5 1;
#X connect 7 0 1 0;
#X connect 8 0 3 0;
#X connect 8 1 6 0;
#X connect 9 0 10 0;
#X connect 10 0 3 0;
#X restore -63 -24 pd add_path_n_filename;
#X obj -260 96 metro 10;
#X obj 96 116 s \$0-to_msgfile_dcpl;
#X obj -250 186 r \$0-to_msgfile_dcpl;
#X obj -260 216 msgfile;
#X obj 177 256 s \$0-stop_load_dcpl;
#X obj -260 6 r \$0-stop_load_dcpl;
#X obj -159 751 spigot;
#X obj -260 751 spigot;
#X obj -260 781 unpack f;
#X obj -159 721 list trim;
#X obj -260 811 outlet txtsize;
#X obj -159 811 outlet txt_colour;
#X msg 57 377 1;
#X msg 96 377 0;
#X obj 57 346 route 1;
#X obj -38 751 spigot;
#X obj -38 811 outlet countext1;
#X msg 137 377 1;
#X msg 176 377 0;
#X msg 217 377 1;
#X msg 256 377 0;
#X obj 77 751 spigot;
#X obj 184 751 spigot;
#X obj 137 226 route 4;
#X obj -38 781 l2s;
#X obj 137 286 s \$0-next;
#X obj 137 256 bang;
#X obj 77 811 outlet startnum;
#X obj 184 811 outlet endnum;
#X obj 137 346 route 2;
#X obj 217 346 route 3;
#X connect 0 0 2 0;
#X connect 1 0 13 0;
#X connect 1 0 14 0;
#X connect 1 0 30 0;
#X connect 1 0 39 0;
#X connect 1 0 45 0;
#X connect 1 0 46 0;
#X connect 2 0 19 0;
#X connect 2 1 1 0;
#X connect 3 0 16 0;
#X connect 4 0 6 0;
#X connect 5 0 17 0;
#X connect 6 0 8 0;
#X connect 6 1 5 0;
#X connect 6 2 17 0;
#X connect 7 0 15 0;
#X connect 8 0 1 0;
#X connect 8 0 16 0;
#X connect 9 0 22 1;
#X connect 10 0 22 1;
#X connect 11 0 23 1;
```

```
#X connect 12 0 23 1;
#X connect 13 0 9 0;
#X connect 13 1 10 0;
#X connect 14 0 11 0;
#X connect 14 1 12 0;
#X connect 15 0 4 0;
#X connect 16 0 0 0;
#X connect 18 0 19 0;
#X connect 19 0 23 0;
#X connect 19 0 25 0;
#X connect 19 0 31 0;
#X connect 19 0 37 0;
#X connect 19 0 38 0;
#X connect 21 0 3 0;
#X connect 22 0 27 0;
#X connect 23 0 24 0;
#X connect 24 0 26 0;
#X connect 25 0 22 0;
#X connect 28 0 31 1;
#X connect 29 0 31 1;
#X connect 30 0 28 0;
#X connect 30 1 29 0;
#X connect 31 0 40 0;
#X connect 33 0 37 1;
#X connect 34 0 37 1;
#X connect 35 0 38 1;
#X connect 36 0 38 1;
#X connect 37 0 43 0;
#X connect 38 0 44 0;
#X connect 39 0 20 0;
#X connect 39 0 42 0;
#X connect 40 0 32 0;
#X connect 42 0 41 0;
#X connect 45 0 33 0;
#X connect 45 1 34 0;
#X connect 46 0 35 0;
#X connect 46 1 36 0;
#X restore -137 -4 pd disptxt_counter_parameter_loader;
#X obj 13 156 t b a;
#X obj -224 226 t b b b b;
#X obj -224 100 t b b;
#X msg -14 66 1;
#X obj 103 356 s \$0-next;
#X obj 103 296 bang;
#X msg 13 226 set \$2 of \$3;
#X obj 103 326 delay 10;
#X connect 0 0 1 0;
#X connect 2 0 5 0;
#X connect 4 0 7 0;
#X connect 4 0 0 0;
#X connect 5 0 3 0;
#X connect 6 0 31 0;
#X connect 7 0 2 0;
#X connect 7 0 33 0;
#X connect 7 1 26 0;
#X connect 7 2 30 0;
#X connect 12 0 13 0;
#X connect 13 0 9 0;
#X connect 15 0 16 0;
#X connect 16 0 8 0;
#X connect 18 0 19 0;
#X connect 19 0 10 0;
#X connect 21 0 11 0;
#X connect 23 0 24 0;
#X connect 24 0 6 0;
#X connect 25 0 34 0;
#X connect 26 0 34 0;
#X connect 27 0 6 0;
#X connect 27 1 6 0;
#X connect 28 0 15 0;
#X connect 29 0 37 0;
#X connect 30 0 12 0;
#X connect 30 1 28 0;
#X connect 30 2 18 0;
#X connect 30 3 25 0;
#X connect 30 4 29 2;
#X connect 31 0 29 0;
#X connect 31 1 29 1;
#X connect 32 0 21 0;
#X connect 32 1 19 0;
#X connect 32 2 16 0;
#X connect 32 3 13 0;
#X connect 33 0 32 0;
#X connect 33 1 29 0;
#X connect 34 0 27 0;
#X connect 36 0 38 0;
#X connect 37 0 21 0;
#X connect 37 0 36 0;
#X connect 38 0 35 0;
#X restore 11 68 pd v_disptxt_count;
#X restore 359 438 pd program_engines;
#X text 352 692 DATA CAPTURE;
#X text 351 46 USERS INTERFACE;
#N canvas 736 22 189 143 buttons_keys 0;
#N canvas 0 22 197 706 buttons_keys_to_numbers 0;
#X obj 11 673 s \$0-numbers;
#X obj 11 643 spigot;
#X obj 44 613 r \$0-tglnum;
#X msg 71 273 6;
#X msg 71 333 7;
#X msg 71 393 8;
#X msg 71 453 9;
#X msg 71 513 10;
#X msg 71 563 11;
#X msg 71 33 1;
#X msg 71 63 2;
#X msg 71 93 3;
#X msg 71 153 4;
#X msg 71 213 5;
#X obj 121 13 r \$0--/1;
#X obj 121 43 r \$0-home/2;
#X obj 121 73 r \$0-+/3;
#X obj 121 253 r \$0-a/A;
#X obj 121 373 r \$0-d/D;
#X obj 121 433 r \$0-j/J;
#X obj 121 493 r \$0-k/K;
#X obj 121 543 r \$0-l/L;
#X obj 121 133 r \$0-1/y/Y;
#X obj 121 193 r \$0-2/n/N;
```

```
#X obj 121 313 r \$0-s/S;
#X obj 131 583 r \$0-clrp;
#X msg 131 613 0;
#X connect 1 0 0 0;
#X connect 2 0 1 1;
#X connect 3 0 1 0;
#X connect 4 0 1 0;
#X connect 5 0 1 0;
#X connect 6 0 1 0;
#X connect 7 0 1 0;
#X connect 8 0 1 0;
#X connect 9 0 1 0;
#X connect 10 0 1 0;
#X connect 11 0 1 0;
#X connect 12 0 1 0;
#X connect 13 0 1 0;
#X connect 14 0 9 0;
#X connect 15 0 10 0;
#X connect 16 0 11 0;
#X connect 17 0 3 0;
#X connect 18 0 5 0;
#X connect 19 0 6 0;
#X connect 20 0 7 0;
#X connect 21 0 8 0;
#X connect 22 0 12 0;
#X connect 23 0 13 0;
#X connect 24 0 4 0;
#X connect 25 0 26 0;
#X connect 26 0 1 1;
#X restore -86 23 pd buttons_keys_to_numbers;
#N canvas 1058 46 457 877 keyboard 0;
#X text -128 384 a/A;
#X text -128 444 s/S;
#X text -128 504 d/D;
#X text -128 564 j/J;
#X text -128 624 k/K;
#X text -128 684 l/L;
#X obj -99 373 select 97;
#X obj -99 403 select 65;
#X obj -99 433 select 115;
#X obj -99 463 select 83;
#X obj -99 493 select 100;
#X obj -99 523 select 68;
#X obj -99 553 select 106;
#X obj -99 583 select 74;
#X obj -99 613 select 107;
#X obj -99 643 select 75;
#X obj -99 673 select 108;
#X obj -99 703 select 76;
#X obj -99 73 select 49;
#X obj -99 133 select 50;
#X obj -99 193 select 51;
#X obj -99 253 select 121;
#X text -115 74 1;
#X text -115 134 2;
#X text -115 194 3;
#X obj -99 313 select 110;
#X obj -99 283 select 89;
#X obj -99 343 select 78;
#X text -128 269 y/Y;
#X text -128 329 n/N;
#X obj -99 733 select 32;
#X text -141 732 space;
#X text -48 -58 keyboard action;
#X obj 1 133 s \$0-f_-/1;
#X obj 1 193 s \$0-f_home/2;
#X obj 1 253 s \$0-f_+/3;
#X obj 1 313 s \$0-f_1/y/Y;
#X obj 1 373 s \$0-f_2/n/N;
#X obj 1 433 s \$0-f_a/A;
#X obj 1 553 s \$0-f_d/D;
#X obj 1 613 s \$0-f_j/J;
#X obj 1 673 s \$0-f_k/K;
#X obj 1 723 s \$0-f_l/L;
#X obj 1 493 s \$0-f_s/S;
#X obj 1 763 s \$0-f_A/space;
#X obj -216 12 spigot;
#X obj -216 -58 key;
#X obj -183 -58 r \$0-tgl_keyb;
#X obj 94 -58 gemkeyboard;
#X obj 94 12 spigot;
#X obj 161 73 select 18;
#X obj 161 103 select 83;
#X obj 161 133 select 19;
#X obj 161 163 select 84;
#X obj 161 193 select 20;
#X obj 161 223 select 85;
#X obj 161 273 select 16;
#X obj 161 333 select 45;
#X obj 161 393 select 0;
#X obj 161 453 select 1;
#X obj 161 513 select 2;
#X obj 161 573 select 38;
#X obj 161 633 select 40;
#X obj 161 693 select 37;
#X obj 161 733 select 49;
#X obj 161 -17 select 53;
#X obj 161 13 s \$0-gemoff;
#X connect 6 0 38 0;
#X connect 7 0 38 0;
#X connect 8 0 43 0;
#X connect 9 0 43 0;
#X connect 10 0 39 0;
#X connect 11 0 39 0;
#X connect 12 0 40 0;
#X connect 13 0 40 0;
#X connect 14 0 41 0;
#X connect 15 0 41 0;
#X connect 16 0 42 0;
#X connect 17 0 42 0;
#X connect 18 0 33 0;
#X connect 19 0 34 0;
#X connect 20 0 35 0;
#X connect 21 0 36 0;
#X connect 25 0 37 0;
#X connect 26 0 36 0;
#X connect 27 0 37 0;
#X connect 30 0 44 0;
#X connect 45 0 6 0;
```

```
#X connect 45 0 7 0;
#X connect 45 0 8 0;
#X connect 45 0 9 0;
#X connect 45 0 10 0;
#X connect 45 0 11 0;
#X connect 45 0 12 0;
#X connect 45 0 13 0;
#X connect 45 0 14 0;
#X connect 45 0 15 0;
#X connect 45 0 16 0;
#X connect 45 0 17 0;
#X connect 45 0 18 0;
#X connect 45 0 19 0;
#X connect 45 0 20 0;
#X connect 45 0 21 0;
#X connect 45 0 26 0;
#X connect 45 0 25 0;
#X connect 45 0 30 0;
#X connect 46 0 45 0;
#X connect 47 0 45 1;
#X connect 47 0 49 1;
#X connect 48 0 49 0;
#X connect 48 0 65 0;
#X connect 49 0 50 0;
#X connect 49 0 51 0;
#X connect 49 0 52 0;
#X connect 49 0 53 0;
#X connect 49 0 56 0;
#X connect 49 0 57 0;
#X connect 49 0 58 0;
#X connect 49 0 59 0;
#X connect 49 0 60 0;
#X connect 49 0 61 0;
#X connect 49 0 62 0;
#X connect 49 0 63 0;
#X connect 49 0 64 0;
#X connect 50 0 33 0;
#X connect 51 0 33 0;
#X connect 52 0 34 0;
#X connect 53 0 34 0;
#X connect 54 0 35 0;
#X connect 55 0 35 0;
#X connect 56 0 36 0;
#X connect 57 0 37 0;
#X connect 58 0 38 0;
#X connect 59 0 43 0;
#X connect 60 0 39 0;
#X connect 61 0 40 0;
#X connect 62 0 41 0;
#X connect 63 0 42 0;
#X connect 64 0 44 0;
#X connect 65 0 66 0;
#X restore -86 -37 pd keyboard;
#N canvas 400 222 305 378 Wiimote_buttons 0;
#X obj -80 174 select /one;
#X obj -80 204 select /two;
#X obj -80 144 select /plus;
#X obj -80 84 select /minus;
#X obj -80 114 select /home;
#X obj 21 120 s \$0-f_-/1;
#X obj 21 150 s \$0-f_home/2;
#X obj 21 180 s \$0-f_+/3;
#X obj 21 210 s \$0-f_1/y/Y;
#X obj 21 240 s \$0-f_2/n/N;
#X obj -80 244 select /a;
#X obj -80 304 select 1;
#X obj -80 275 tgl 15 0 empty empty empty 17 7 0 10 -262144 -1 -1 0
1;
#X obj 21 330 s \$0-f_A/space;
#X obj -140 10 r \$0-Wii_btns;
#X connect 0 0 8 0;
#X connect 1 0 9 0;
#X connect 2 0 7 0;
#X connect 3 0 5 0;
#X connect 4 0 6 0;
#X connect 10 0 12 0;
#X connect 11 0 13 0;
#X connect 12 0 11 0;
#X connect 14 0 3 0;
#X connect 14 0 4 0;
#X connect 14 0 2 0;
#X connect 14 0 0 0;
#X connect 14 0 1 0;
#X connect 14 0 10 0;
#X restore -86 -7 pd Wiimote_buttons;
#N canvas 740 502 407 221 button_A/space_action 0;
#X obj -252 183 s \$0-next;
#X obj -252 53 gate 4;
#N canvas 975 412 145 133 restart 0;
#X obj 3 -1 inlet;
#X obj 3 89 s \$0-next;
#X obj 3 29 t b b;
#X obj 30 59 s \$0-setready_bng;
#X connect 0 0 2 0;
#X connect 2 0 1 0;
#X connect 2 1 3 0;
#X restore -230 123 pd restart;
#X obj -241 153 s \$0-rep_inst;
#X text -129 124 3: restart;
#X text -129 154 2: repeat playback;
#X text -129 184 1: next;
#X obj -252 13 r \$0-btnAact;
#X text -204 54 btnAact: btnA/space action;
#X obj -169 13 r \$0-A/space;
#X obj -219 93 s \$0-rtcap_nom;
#X text -129 94 4: real time nominal data capture;
#X connect 1 0 0 0;
#X connect 1 1 3 0;
#X connect 1 2 2 0;
#X connect 1 3 10 0;
#X connect 7 0 1 0;
#X connect 9 0 1 1;
#X restore -86 53 pd button_A/space_action;
#X restore 359 303 pd buttons_keys;
#N canvas 794 30 276 344 OSC_receive 0;
#X obj -82 113 unpack s f;
#X obj -82 83 routeOSC /button;
#X obj -82 -67 unpackOSC;
#X obj -82 -37 routeOSC /wii;
```

```
#X obj -62 -7 routeOSC /orientation;
#X obj -82 143 s \$0-Wii_btns;
#X obj 45 163 spigot;
#X obj 78 133 r \$0-tglwii_y;
#X obj 45 103 r \$0-wii_y_test_s;
#X obj 45 83 s \$0-wii_y_test_r;
#X obj -12 23 unpack f f;
#X obj 45 53 * -1;
#N canvas 877 332 402 287 udp_receive 0;
#X obj 118 205 outlet;
#N canvas 1237 172 147 94 \$0-udp_prov 0;
#X obj 1 1 udpreceive 5600;
#X obj 1 50 send udprecout;
#X connect 0 0 1 0;
#X restore 18 176 pd \$0-udp_prov;
#X obj -102 176 s pd-\$0-udp_prov;
#X obj -154 -45 r \$0-tgl_wiimote;
#X msg -102 135 clear \, obj 1 1 udpreceive \$1 \, obj 1 50 send udprecout
\, connect 0 0 1 0;
#X obj 118 176 r udprecout;
#X msg -154 135 clear;
#X msg -89 15 set \$1;
#X obj -89 45 t a a;
#X obj -129 75 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144
-1 -1;
#X obj -154 -15 route 0 1;
#X msg -129 105 5600;
#X obj -89 -15 r \$0-oscport_usr;
#X connect 3 0 10 0;
#X connect 4 0 2 0;
#X connect 5 0 0 0;
#X connect 6 0 2 0;
#X connect 7 0 8 0;
#X connect 8 0 9 0;
#X connect 8 1 11 0;
#X connect 9 0 11 0;
#X connect 10 0 6 0;
#X connect 10 1 9 0;
#X connect 11 0 4 0;
#X connect 12 0 7 0;
#X restore -82 -99 pd udp_receive;
#X obj 45 193 s \$0-rt_y_wii_data;
#X connect 0 0 5 0;
#X connect 1 0 0 0;
#X connect 2 0 3 0;
#X connect 3 0 1 0;
#X connect 3 0 4 0;
#X connect 4 0 10 0;
#X connect 6 0 13 0;
#X connect 7 0 6 1;
#X connect 8 0 6 0;
#X connect 10 1 11 0;
#X connect 11 0 9 0;
#X connect 12 0 2 0;
#X restore 359 163 pd OSC_receive;
#N canvas 568 22 266 456 stroop_engine 0;
#X obj -130 -110 msgfile;
#X obj -25 -140 s txt_reset;
#X obj -25 -170 bng 15 250 50 0 empty empty empty -18 -10 0 10 -262144
-1 -1;
#X obj -163 40 s \$0-txtsize;
#X obj -52 -230 pack s;
#X obj -52 -260 r \$0-stroop;
#N canvas 850 22 252 505 stroop_loader 0;
#X msg -102 30 read \$1;
#X obj -102 -26 inlet file name;
#X obj -115 -60 r \$0-txtsize;
#X obj -75 350 outlet gates;
#X msg -75 310 1;
#N canvas 420 618 364 195 add_path_n_filename 0;
#X obj 250 -28 inlet;
#X obj 232 122 outlet;
#X obj 7 -28 r \$0-prg_path;
#X msg 7 32 symbol /Users/juigmend/Desktop/Experiment 3/Experiment_3_Data_Recording
;
#X msg 7 2 set symbol \$1;
#X obj 232 62 pack s s;
#X obj 277 32 l2s;
#X obj 232 92 makesymbol %s/%s;
#X obj 250 2 t a a;
#X obj 107 -28 r loadbang;
#X msg 107 2 set;
#X connect 0 0 8 0;
#X connect 2 0 4 0;
#X connect 3 0 5 0;
#X connect 4 0 3 0;
#X connect 5 0 7 0;
#X connect 6 0 5 1;
#X connect 7 0 1 0;
#X connect 8 0 3 0;
#X connect 8 1 6 0;
#X connect 9 0 10 0;
#X connect 10 0 3 0;
#X restore -102 0 pd add_path_n_filename;
#X msg -102 120 end \, skip -1 \, where;
#X msg -115 310 2;
#X obj -145 -90 r \$0_colours2use;
#X msg -145 310 3;
#X obj 0 310 s \$0-to_msgfile;
#X msg 0 270 goto \$1;
#X obj -75 90 s \$0-to_msgfile;
#X obj -102 150 s \$0-to_msgfile;
#X obj -27 240 t a a;
#X obj -102 180 r \$0-totalines_stroop;
#X obj -102 60 t a a;
#X obj -102 210 t a a;
#X obj -145 380 s \$0-trg_stroop_1st_slide;
#X obj -27 210 r \$0-stroop_index;
#X msg -102 270 this;
#X msg -115 350 1;
#X msg -75 240 rewind;
#X connect 0 0 16 0;
#X connect 1 0 5 0;
#X connect 2 0 7 0;
#X connect 4 0 3 0;
#X connect 5 0 0 0;
#X connect 6 0 13 0;
#X connect 7 0 3 0;
#X connect 7 0 21 0;
```

```
#X connect 8 0 9 0;
#X connect 9 0 3 0;
#X connect 9 0 18 0;
#X connect 11 0 10 0;
#X connect 14 0 20 0;
#X connect 14 1 11 0;
#X connect 15 0 17 0;
#X connect 16 0 6 0;
#X connect 16 1 12 0;
#X connect 17 0 20 0;
#X connect 17 1 22 0;
#X connect 19 0 14 0;
#X connect 20 0 10 0;
#X connect 21 0 14 0;
#X connect 22 0 4 0;
#X connect 22 0 10 0;
#X restore -163 -170 pd stroop_loader;
#X obj -146 70 s \$0-gemon;
#X obj -130 -20 s \$0-stroop_txt;
#N canvas 996 368 210 243 realtimer 0;
#X obj -92 61 realtime;
#X obj 21 1 r \$0-numbers;
#X obj 38 31 bng 15 50 10 0 empty empty empty 17 7 0 10 -262144 -1
-1;
#X obj -92 206 s \$0-stroop_time;
#X obj -92 31 bng 15 50 10 0 empty empty empty 17 7 0 10 -262144 -1
-1;
#X msg -65 146 set \$1;
#X obj -92 121 t a a;
#X msg -92 176 1180;
#X obj -92 1 r \$0-stroop_txt;
#X obj 38 206 outlet;
#X obj -92 91 int;
#X connect 0 0 10 0;
#X connect 1 0 2 0;
#X connect 2 0 0 1;
#X connect 2 0 9 0;
#X connect 4 0 0 0;
#X connect 5 0 7 0;
#X connect 6 0 7 0;
#X connect 6 1 5 0;
#X connect 7 0 3 0;
#X connect 8 0 4 0;
#X connect 10 0 6 0;
#X restore -20 -20 pd realtimer;
#X obj -68 100 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144
-1 -1;
#X obj -163 -80 gate 3;
#X obj -147 10 s \$0_colours2use;
#N canvas 1107 22 388 397 colours_randomizer 0;
#X obj -144 66 unpack s s s s s s;
#X obj -84 -74 length;
#X obj 88 66 route 1 2 3 4 5 6;
#X obj -144 -104 r \$0_colours2use;
#X obj 88 16 shuffle;
#X msg -84 -14 1;
#X msg 127 -14 0.15;
#X msg -144 209;
#X msg -94 209;
#X msg -44 209;
#X msg 6 209;
#X msg 56 209;
#X msg 106 209;
#X msg -144 129 set \$1;
#X msg -94 129 set \$1;
#X msg -44 129 set \$1;
#X msg 6 129 set \$1;
#X msg 56 129 set \$1;
#X msg 106 129 set \$1;
#X msg 176 139 set;
#X obj 88 -72 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144 -1
-1;
#X obj -70 259 s \$0-txt_colour;
#X obj -11 66 s \$0-rndcolnum;
#X obj -11 36 + 5;
#X obj -84 -44 t f f f;
#X obj 176 109 r \$0-clrp;
#X obj 88 -104 inlet;
#X obj 38 259 outlet;
#X obj 162 254 print rndcol;
#X connect 0 0 13 0;
#X connect 0 1 14 0;
#X connect 0 2 15 0;
#X connect 0 3 16 0;
#X connect 0 4 17 0;
#X connect 0 5 18 0;
#X connect 1 0 24 0;
#X connect 2 0 7 0;
#X connect 2 1 8 0;
#X connect 2 2 9 0;
#X connect 2 3 10 0;
#X connect 2 4 11 0;
#X connect 2 5 12 0;
#X connect 3 0 1 0;
#X connect 3 0 0 0;
#X connect 4 0 2 0;
#X connect 4 0 23 0;
#X connect 5 0 4 0;
#X connect 6 0 4 2;
#X connect 7 0 21 0;
#X connect 7 0 27 0;
#X connect 8 0 21 0;
#X connect 8 0 27 0;
#X connect 9 0 21 0;
#X connect 9 0 27 0;
#X connect 10 0 21 0;
#X connect 10 0 27 0;
#X connect 11 0 21 0;
#X connect 11 0 27 0;
#X connect 12 0 21 0;
#X connect 12 0 27 0;
#X connect 13 0 7 0;
#X connect 14 0 8 0;
#X connect 15 0 9 0;
#X connect 16 0 10 0;
#X connect 17 0 11 0;
#X connect 18 0 12 0;
#X connect 19 0 7 0;
#X connect 19 0 8 0;
```

```
#X connect 19 0 9 0;
#X connect 19 0 10 0;
#X connect 19 0 11 0;
#X connect 19 0 12 0;
#X connect 20 0 4 0;
#X connect 23 0 22 0;
#X connect 23 0 28 0;
#X connect 24 0 5 0;
#X connect 24 1 4 1;
#X connect 24 2 6 0;
#X connect 25 0 19 0;
#X connect 26 0 20 0;
#X restore -68 124 pd colours_randomizer;
#X obj -130 -140 r \$0-to_msgfile;
#X obj -91 -50 s \$0-totalines_stroop;
#N canvas 664 614 215 119 lines_randomizer 0;
#X obj 46 47 shuffle;
#X msg 85 17 0.15;
#X obj -3 17 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144 -1
-1;
#X obj -3 -13 inlet;
#X obj 46 77 s \$0-stroop_index;
#X msg 26 17 2;
#X obj 65 -13 r \$0-totalines_stroop;
#X connect 0 0 4 0;
#X connect 1 0 0 2;
#X connect 2 0 0 0;
#X connect 3 0 2 0;
#X connect 5 0 0 0;
#X connect 6 0 0 1;
#X connect 6 0 1 0;
#X connect 6 0 5 0;
#X restore -68 154 pd lines_randomizer;
#X obj -91 -80 route float;
#X obj -68 40 r \$0-trg_stroop_1st_slide;
#N canvas 628 572 209 269 stroop_counter 0;
#X obj 15 -143 r \$0-totalines_stroop;
#X obj -55 -83 cup;
#X obj -55 -23 ==;
#X obj -55 7 route 1;
#X obj -55 37 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144 -1
-1;
#X obj -55 -143 inlet;
#X obj -40 -53 - 1;
#X obj -55 97 s \$0-stroop_done;
#X obj -45 67 s \$0-gemoff;
#X msg -27 -113 1;
#X obj -16 37 s \$0-stroop_trg_nxt;
#X connect 0 0 9 0;
#X connect 0 0 6 0;
#X connect 1 0 2 0;
#X connect 2 0 3 0;
#X connect 3 0 4 0;
#X connect 3 1 10 0;
#X connect 4 0 8 0;
#X connect 4 0 7 0;
#X connect 5 0 1 0;
#X connect 6 0 2 1;
#X connect 9 0 1 0;
#X restore -20 10 pd stroop_counter;
#X obj -52 -200 t a a;
#X obj -48 70 r \$0-stroop_trg_nxt;
#X connect 0 0 11 1;
#X connect 0 1 17 0;
#X connect 2 0 1 0;
#X connect 4 0 20 0;
#X connect 5 0 4 0;
#X connect 6 0 11 0;
#X connect 9 0 19 0;
#X connect 10 0 13 0;
#X connect 11 0 3 0;
#X connect 11 1 12 0;
#X connect 11 2 8 0;
#X connect 13 0 16 0;
#X connect 14 0 0 0;
#X connect 17 0 15 0;
#X connect 18 0 7 0;
#X connect 18 0 10 0;
#X connect 20 0 6 0;
#X connect 20 1 2 0;
#X connect 21 0 10 0;
#X restore 359 716 pd stroop_engine;
#X obj 20 583 cnv 15 108 28 empty empty empty 20 12 0 14 -191407 -66577
0;
#X obj 22 585 cnv 18 104 24 empty empty value 10 12 0 10 -1 -261682
0;
#X floatatom 72 589 8 0 0 0 - #0-dispval #0-nonono;
#X obj 20 455 cnv 15 304 40 empty empty empty 20 12 0 14 -191407 -66577
0;
#X text 351 411 PROGRAM COMMANDS;
#X text 38 98 Data Collecting and Audiovisual Presentation;
#X obj 216 583 cnv 15 108 28 empty empty empty 20 12 0 14 -191407 -66577
0;
#X obj 222 240 bng 16 250 50 0 \$0-opentestw \$0-nono empty 17 7 0
10 -2752 -1 -1;
#N canvas 373 22 287 580 \$0-adjust_and_test 0;
#N canvas 500 22 302 699 adjust_and_test_SUB 0;
#X obj 11 11 cnv 15 280 558 empty empty set-adjust-test 88 12 0 12
-43798 -204786 0;
#X obj 21 316 cnv 15 260 186 empty empty test_Wiimote_buttons_and_keyboard
30 12 0 10 -249661 -13381 0;
#X obj 35 396 bng 15 250 50 0 \$0-A/space \$0-f_A/space A/space 20
7 0 10 -258113 -1 -1;
#X obj 88 366 tgl 15 1 \$0-tgl_keyb \$0-nono Keyboard -14 -10 0 10
-262130 -1 -1 1 1;
#X obj 35 474 bng 15 250 50 0 \$0-+/3 \$0-f_+/3 3:+/3 18 7 0 10 -262144
-1 -1;
#X obj 125 396 bng 15 250 50 0 \$0-1/y/Y \$0-f_1/y/Y 4:1/y/Y 18 7 0
10 -262144 -1 -1;
#X obj 125 422 bng 15 250 50 0 \$0-2/n/N \$0-f_2/n/N 5:2/n/N 18 7 0
10 -262144 -1 -1;
#X obj 35 448 bng 15 250 50 0 \$0-home/2 \$0-f_home/2 2:home/2 18 7
0 10 -262144 -1 -1;
#X obj 35 422 bng 15 250 50 0 \$0--/1 \$0-f_-/1 1:-/1 18 7 0 10 -262144
-1 -1;
#X obj 125 448 bng 15 250 50 0 \$0-a/A \$0-f_a/A 6:a/A 18 7 0 10 -262144
-1 -1;
#X obj 215 448 bng 15 250 50 0 \$0-k/K \$0-f_k/K 10:k/K 18 7 0 10 -262144
-1 -1;
```

```
#X obj 215 474 bng 15 250 50 0 \$0-l/L \$0-f_l/L 11:l/L 18 7 0 10 -262144
-1 -1;
#X obj 215 396 bng 15 250 50 0 \$0-d/D \$0-f_d/D 8:d/D 18 7 0 10 -262144
-1 -1;
#X obj 125 474 bng 15 250 50 0 \$0-s/S \$0-f_s/S 7:s/S 18 7 0 10 -262144
-1 -1;
#X obj 215 422 bng 15 250 50 0 \$0-j/J \$0-f_j/J 9:j/J 18 7 0 10 -262144
-1 -1;
#X obj 21 37 cnv 15 260 120 empty empty adjust_audio_levels 72 12 0
10 -249661 -13381 0;
#X obj 27 61 cnv 10 200 34 empty empty empty 20 12 0 14 -43798 -66577
0;
#X obj 29 63 cnv 15 196 30 empty empty empty 20 12 0 14 -204786 -66577
0;
#X obj 112 71 hsl 100 15 0 1 0 0 \$0-infader empty (-)----------(+)
-2 7 0 10 -262144 -1 -86277 0 1;
#X obj 242 63 vu 8 80 \$0-vul empty -1 -8 0 10 -1 -1 0 0;
#X obj 260 63 vu 8 80 \$0-vur empty -1 -8 0 10 -1 -1 0 0;
#X obj 81 71 tgl 15 0 \$0-tgltestin \$0-nono empty 17 7 0 10 -259678
-1 -1 0 1;
#X obj 27 111 cnv 10 200 34 empty empty empty 20 12 0 14 -43798 -66577
0;
#X obj 29 113 cnv 15 196 30 empty empty empty 20 12 0 14 -204786 -66577
0;
#X obj 112 121 hsl 100 15 0 1 0 0 \$0-outfader empty (-)----------(+)
-2 7 0 10 -262144 -1 -86277 9900 1;
#X obj 81 121 tgl 15 0 \$0-tgltestout \$0-nono empty 17 7 0 10 -97216
-1 -1 0 1;
#X text 36 121 output;
#X text 42 71 input;
#X obj 21 259 cnv 15 260 46 empty empty test_Wiimote_motion 70 12 0
10 -249661 -13381 0;
#X obj 29 285 hsl 240 12 -100 100 0 1 \$0-wii_y_test_s \$0-wii_y_test_r
pitch 10 6 0 10 -262144 -1 -1 11950 1;
#X obj 10 618 f \$0;
#X obj 10 588 r \$0-opentestw;
#X obj 178 366 tgl 15 1 \$0-tgl_wiimote \$0-nono Wiimote -12 -10 0
10 -204800 -1 -1 1 1;
#X obj 21 168 cnv 15 125 80 empty empty Wiimote_OSC_port 14 12 0 10
-249661 -13381 0;
#X floatatom 67 204 5 0 0 0 - #0-oscport_def #0-oscport_usr;
#X obj 21 513 cnv 15 260 46 empty empty program 108 12 0 10 -249661
-13381 0;
#X obj 35 537 bng 15 250 50 0 \$0-openpanel_load_prg \$0-nono empty
17 7 0 10 -194112 -1 -1;
#X symbolatom 61 537 34 0 0 0 - #0-progname #0-nonono;
#X msg 10 653 \; pd-\$1-adjust_and_test vis 1;
#X obj 156 168 cnv 15 125 80 empty empty data_capture_rate 12 12 0
10 -249661 -13381 0;
#X obj 226 194 vradio 15 1 1 3 \$0-rt_rate \$0-nono empty 0 -8 0 10
-262144 -1 -1 1;
#X text 193 193 4 Hz;
#X text 187 207 10 Hz;
#X text 181 222 100 Hz;
#X connect 30 0 38 0;
#X connect 31 0 30 0;
#X coords 0 -1 1 1 282 560 1 10 10;
#X restore -116 -6 pd adjust_and_test_SUB;
#X coords 0 0 1 1 452 226 0;
#X restore 359 273 pd \$0-adjust_and_test;
#X text 19 656 6) click to restart from (3);
#N canvas 0 22 348 132 rtd 0;
#N canvas 388 324 483 357 (subpatch) 0;
#X array \$0-real_time_data 1 float 0;
#X coords 0 100 1 -100 290 40 1;
#X restore 11 11 graph;
#X obj 11 11 cnv 15 290 40 empty empty empty 20 12 0 14 -245500 -66577
0;
#X coords 0 -100 1 100 292 42 2 10 10;
#X restore 26 523 pd rtd;
#X obj 218 585 cnv 18 104 24 empty empty time 14 12 0 10 -1 -261682
0;
#X floatatom 268 589 8 0 0 0 - #0-disptime #0-nonono;
#X obj 22 457 cnv 18 300 36 empty empty step 140 8 0 10 -1 -261682
0;
#X symbolatom 52 473 44 0 0 0 - #0-dispcurr #0-nonono;
#X floatatom 25 473 3 0 0 0 - #0-icounter #0-nonono;
#X text 19 240 2) click to set \, adjust and test;
#N canvas 839 22 163 187 gemcontrol 0;
#X obj -59 22 t a a;
#X msg -59 -8 1;
#N canvas 625 681 178 186 gemchain_VA 0;
#X obj -75 6 gemhead;
#X obj -75 36 color 1 1 1;
#X obj -75 126 s gemchain;
#X obj -75 96 translateXYZ 0 -1 0;
#X obj -75 -24 inlet 1/0;
#N canvas 631 814 432 161 colour 0;
#X obj 83 -24 inlet colour name;
#X msg 11 56 255 0 0;
#X msg 67 56 255 255 0;
#X msg 141 56 0 255 0;
#X msg 201 56 0 0 255;
#X msg 261 56 204 0 204;
#X msg 331 56 255 255 255;
#X obj 201 106 outlet RGB;
#X obj 83 7 route r y g b p w;
#X connect 0 0 8 0;
#X connect 1 0 7 0;
#X connect 2 0 7 0;
#X connect 3 0 7 0;
#X connect 4 0 7 0;
#X connect 5 0 7 0;
#X connect 6 0 7 0;
#X connect 8 0 1 0;
#X connect 8 1 2 0;
#X connect 8 2 3 0;
#X connect 8 3 4 0;
#X connect 8 4 5 0;
#X connect 8 5 6 0;
#X restore -12 6 pd colour to RGB;
#X obj -12 -24 r \$0-txt_colour;
#X floatatom -1 66 5 0 0 0 - - -;
#X connect 0 0 1 0;
#X connect 1 0 3 0;
#X connect 3 0 2 0;
#X connect 4 0 0 0;
#X connect 5 0 1 1;
#X connect 6 0 5 0;
```

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#X connect 7 0 3 2;
#X restore -59 82 pd gemchain_VA;
#X msg 11 -8 0;
#X obj 31 -38 r \$0-clrp;
#X obj -59 -36 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144
-1 -1;
#X obj -59 -68 r \$0-gemon;
#X obj 11 -68 r \$0-gemoff;
#N canvas 759 547 410 322 gem_window 0;
#X msg -113 195 create;
#X msg -34 224 destroy;
#X obj 73 285 gemwin;
#X msg 24 224 reset;
#X obj -128 35 route 1 0;
#X obj 7 135 bng 15 250 50 0 empty empty empty 0 -6 0 10 -262144 -1
-1;
#X obj -113 224 t a a;
#X msg -113 254 1;
#X obj -128 5 inlet 1/0;
#X obj -113 165 spigot;
#X msg -80 135 0;
#X msg -40 135 1;
#X obj -40 35 loadbang;
#X msg 113 164 menubar 0;
#X msg 119 224 cursor 1;
#X obj 7 164 t b b b b;
#X msg 179 224 fullscreen 0;
#X obj -128 75 t f f b b b;
#X msg 93 134 cursor 0;
#X msg 73 104 fullscreen 1;
#X connect 0 0 6 0;
#X connect 1 0 2 0;
#X connect 3 0 2 0;
#X connect 4 0 17 0;
#X connect 4 1 5 0;
#X connect 4 1 11 0;
#X connect 5 0 15 0;
#X connect 6 0 7 0;
#X connect 6 1 2 0;
#X connect 7 0 2 0;
#X connect 8 0 4 0;
#X connect 9 0 0 0;
#X connect 10 0 9 1;
#X connect 11 0 9 1;
#X connect 12 0 11 0;
#X connect 13 0 2 0;
#X connect 14 0 2 0;
#X connect 15 0 1 0;
#X connect 15 1 3 0;
#X connect 15 2 14 0;
#X connect 15 3 16 0;
#X connect 16 0 2 0;
#X connect 17 0 10 0;
#X connect 17 1 9 0;
#X connect 17 2 13 0;
#X connect 17 3 18 0;
#X connect 17 4 19 0;
#X connect 18 0 2 0;
#X connect 19 0 2 0;
#X restore -32 53 pd gem_window;
#X connect 0 0 2 0;
#X connect 0 1 8 0;
#X connect 1 0 0 0;
#X connect 3 0 0 0;
#X connect 4 0 3 0;
#X connect 5 0 1 0;
#X connect 6 0 5 0;
#X connect 7 0 3 0;
#X restore 360 613 pd gemcontrol;
#N canvas 337 121 422 454 audio_file_player 0;
#X msg 47 171 open \$1;
#X obj 170 341 dac~;
#X obj 123 231 readsf~ 2;
#X obj 50 311 *~;
#X obj 113 311 *~;
#X msg 123 141 1;
#X obj 123 81 bng 15 250 50 0 empty empty play 20 7 0 10 -262144 -145600
-1;
#X obj 50 351 env~;
#X obj 113 351 env~;
#X symbolatom 47 141 6 0 0 0 - - -;
#X obj 50 381 - 100;
#X obj 113 381 - 100;
#X obj 30 231 r \$0-outfader;
#X obj -70 231 *~;
#X obj -55 201 r \$0-tgltestout;
#X obj 47 -10 r \$0-playfile;
#X obj 47 111 pack s;
#X obj -70 91 noise~;
#X obj -70 121 *~ 0.5;
#X obj 174 301 s \$0-playdone;
#X obj 174 201 s \$0-playsync;
#X obj 50 411 s \$0-vul;
#X obj 113 411 s \$0-vur;
#X obj -25 311 r~ \$0-vuin;
#X obj 123 111 delay 500;
#X obj -71 -10 r \$0-playfile_bng;
#X obj 17 81 bng 15 250 50 0 empty empty repeat -40 7 0 10 -262144
-1 -1;
#X obj 174 141 r \$0-setready;
#X msg 137 201 0;
#N canvas 420 618 364 195 add_path_n_filename 0;
#X obj 250 -28 inlet;
#X obj 232 122 outlet;
#X obj 7 -28 r \$0-prg_path;
#X msg 7 32 symbol /Users/juigmend/Desktop/Experiment 3/Experiment_3_Data_Recording
;
#X msg 7 2 set symbol \$1;
#X obj 232 62 pack s s;
#X obj 277 32 l2s;
#X obj 232 92 makesymbol %s/%s;
#X obj 250 2 t a a;
#X obj 107 -28 r loadbang;
#X msg 107 2 set;
#X connect 0 0 8 0;
#X connect 2 0 4 0;
#X connect 3 0 5 0;
#X connect 4 0 3 0;
#X connect 5 0 7 0;
```

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#X connect 6 0 5 1;
#X connect 7 0 1 0;
#X connect 8 0 3 0;
#X connect 8 1 6 0;
#X connect 9 0 10 0;
#X connect 10 0 3 0;
#X restore 47 20 pd add_path_n_filename;
#X obj 256 50 wavinfo;
#X obj 210 271 spigot~;
#X msg 309 110 1;
#X msg 269 110 0;
#X obj 269 80 route 1;
#X obj 174 171 r \$0-clrp;
#X connect 0 0 2 0;
#X connect 2 0 3 0;
#X connect 2 0 31 0;
#X connect 2 1 4 0;
#X connect 2 2 19 0;
#X connect 3 0 1 0;
#X connect 3 0 7 0;
#X connect 4 0 1 1;
#X connect 4 0 8 0;
#X connect 5 0 2 0;
#X connect 5 0 20 0;
#X connect 6 0 24 0;
#X connect 7 0 10 0;
#X connect 8 0 11 0;
#X connect 9 0 0 0;
#X connect 10 0 21 0;
#X connect 11 0 22 0;
#X connect 12 0 3 1;
#X connect 12 0 4 1;
#X connect 13 0 3 0;
#X connect 13 0 4 0;
#X connect 14 0 13 1;
#X connect 15 0 29 0;
#X connect 16 0 9 0;
#X connect 17 0 18 0;
#X connect 18 0 13 0;
#X connect 23 0 7 0;
#X connect 23 0 8 0;
#X connect 24 0 5 0;
#X connect 25 0 6 0;
#X connect 25 0 26 0;
#X connect 26 0 16 0;
#X connect 27 0 28 0;
#X connect 28 0 2 0;
#X connect 29 0 16 0;
#X connect 29 0 6 0;
#X connect 29 0 30 0;
#X connect 30 1 34 0;
#X connect 31 0 4 0;
#X connect 32 0 31 1;
#X connect 33 0 31 1;
#X connect 34 0 33 0;
#X connect 34 1 32 0;
#X connect 35 0 28 0;
#X restore 359 511 pd audio_file_player;
#N canvas 809 75 262 407 audio_file_recorder 0;
#X obj -127 -39 *~;
#X obj -127 -69 *~;
#X obj -27 -9 r \$0-startaudiorec;
#X obj -76 -99 r \$0-tgltestin;
#X obj -75 -69 r \$0-infader;
#X obj -147 276 writesf~ 1;
#X obj -147 -99 adc~ 1;
#X obj -127 121 spigot;
#X msg 0 81 1;
#X msg 38 81 0;
#X obj 38 51 r \$0-next;
#X obj -127 81 r \$0-datafilename;
#X obj -127 51 s \$0-make_file_name;
#X msg -127 221 start;
#X msg 38 222 stop;
#X obj -27 21 t b b;
#X msg -127 151 open \$1;
#X obj 14 21 r \$0-setready;
#X obj -67 182 t b b a;
#X obj -67 276 s \$0-filecounter;
#X obj -127 -9 s~ \$0-vuin;
#X connect 0 0 20 0;
#X connect 1 0 0 0;
#X connect 2 0 15 0;
#X connect 3 0 1 1;
#X connect 4 0 0 1;
#X connect 6 0 1 0;
#X connect 6 0 5 0;
#X connect 7 0 16 0;
#X connect 8 0 7 1;
#X connect 9 0 7 1;
#X connect 9 0 14 0;
#X connect 10 0 9 0;
#X connect 11 0 7 0;
#X connect 13 0 5 0;
#X connect 14 0 5 0;
#X connect 15 0 12 0;
#X connect 15 1 8 0;
#X connect 16 0 18 0;
#X connect 17 0 9 0;
#X connect 18 0 19 0;
#X connect 18 1 13 0;
#X connect 18 2 5 0;
#X restore 359 541 pd audio_file_recorder;
#X text 351 477 ------------------------;
#X text 351 487 AUDIO ENGINES;
#N canvas 881 278 910 648 make_file_name 0;
#X obj 612 399 symbol;
#X msg 475 174 1;
#X msg 262 204 set \$1;
#X obj 262 174 pack s;
#X obj 263 404 symbol;
#X obj 193 553 s \$0-datafilename;
#X obj 133 -45 r \$0-make_file_name;
#X obj 154 15 s \$0-datatrig;
#X msg 56 125 set \$1;
#X obj -14 94 r \$0-year;
#X obj -14 221 r \$0-month;
#X obj -14 311 r \$0-day;
#X obj 56 95 r \$0-partic;
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#X msg -14 124 set \$1;
#X msg -14 251 set \$1;
#X msg -14 341 set \$1;
#X obj 133 174 t b b b b b b;
#X msg 263 374 ;
#X msg 226 374 1;
#X msg 359 404 1;
#X obj 193 493 symbol;
#X msg 145 374 1;
#X msg 183 374 1;
#X msg 543 174 2;
#X msg 107 374 1;
#X msg 612 364 _.wii;
#X msg 662 364 _;
#X obj 543 -13 r oralqstn;
#X msg 612 174 3;
#X obj 749 45 makefilename %s_qstndc;
#X obj 749 15 pack s;
#X msg 262 15 symbol;
#X obj 272 -15 r loadbang;
#X obj 193 431 pack f f f f s f s;
#X msg 359 204 set \$1;
#N canvas 434 679 131 182 filecounter 0;
#X obj 8 -45 r \$0-setready;
#X obj -28 45 cup;
#X obj 8 -15 t b b;
#X obj -28 -45 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144
-1 -1;
#X msg 35 15 1;
#X obj -28 -75 r \$0-filecounter;
#X obj -28 75 outlet;
#X connect 0 0 2 0;
#X connect 1 0 6 0;
#X connect 2 0 1 0;
#X connect 2 1 4 0;
#X connect 3 0 1 0;
#X connect 4 0 1 0;
#X connect 5 0 3 0;
#X restore 359 174 pd filecounter;
#X msg 193 463 \$1_\$2_\$3_p\$4_\$5_f\$6\$7;
#X msg 701 364 _.qst;
#X obj 645 304 r \$0-make_file_name;
#X obj 133 -15 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144
-1 -1;
#X obj 133 54 delay 100;
#X obj 475 274 delay 50;
#X obj 262 -45 r prog_ready;
#X obj 612 -45 r a_datacap_qstn;
#X obj 475 -45 r a_datacap_rt_nom;
#X msg 751 364 _.str;
#X obj 682 85 r v_datacap_stroop;
#X msg 682 174 4;
#X obj 345 -45 r a_datacap_rt_wii_y;
#N canvas 420 618 364 195 add_path_n_filename 0;
#X obj 250 -28 inlet;
#X obj 232 122 outlet;
#X obj 7 -28 r \$0-prg_path;
#X msg 7 32 symbol /Users/juigmend/Desktop/Experiment 3/Experiment_3_Data_Recording
;
#X msg 7 2 set symbol \$1;
#X obj 232 62 pack s s;
#X obj 277 32 l2s;
#X obj 232 92 makesymbol %s/%s;
#X obj 250 2 t a a;
#X obj 107 -28 r loadbang;
#X msg 107 2 set;
#X connect 0 0 8 0;
#X connect 2 0 4 0;
#X connect 3 0 5 0;
#X connect 4 0 3 0;
#X connect 5 0 7 0;
#X connect 6 0 5 1;
#X connect 7 0 1 0;
#X connect 8 0 3 0;
#X connect 8 1 6 0;
#X connect 9 0 10 0;
#X connect 10 0 3 0;
#X restore 193 523 pd add_path_n_filename;
#X text 101 578 d_m_y_participantnumber_audiofilename_trialnumber;
#X obj 749 -45 r v_txt_qst;
#X msg 801 364 _.rpl;
#X obj 612 334 gate 5;
#X msg 752 174 5;
#X obj 752 115 r a_randomplay;
#X connect 0 0 33 6;
#X connect 1 0 41 0;
#X connect 2 0 17 0;
#X connect 3 0 2 0;
#X connect 4 0 33 4;
#X connect 6 0 39 0;
#X connect 8 0 18 0;
#X connect 9 0 13 0;
#X connect 10 0 14 0;
#X connect 11 0 15 0;
#X connect 12 0 8 0;
#X connect 13 0 22 0;
#X connect 14 0 21 0;
#X connect 15 0 24 0;
#X connect 16 0 24 0;
#X connect 16 1 21 0;
#X connect 16 2 22 0;
#X connect 16 3 18 0;
#X connect 16 4 17 0;
#X connect 16 5 19 0;
#X connect 17 0 4 0;
#X connect 18 0 33 3;
#X connect 19 0 33 5;
#X connect 20 0 49 0;
#X connect 21 0 33 1;
#X connect 22 0 33 2;
#X connect 23 0 53 0;
#X connect 24 0 33 0;
#X connect 25 0 0 0;
#X connect 26 0 0 0;
#X connect 27 0 23 0;
#X connect 27 0 3 0;
#X connect 28 0 53 0;
#X connect 29 0 3 0;
#X connect 30 0 29 0;
```

```
#X connect 31 0 3 0;
#X connect 32 0 31 0;
#X connect 33 0 36 0;
#X connect 34 0 19 0;
#X connect 35 0 34 0;
#X connect 36 0 20 0;
#X connect 37 0 0 0;
#X connect 38 0 53 1;
#X connect 39 0 7 0;
#X connect 39 0 40 0;
#X connect 40 0 16 0;
#X connect 41 0 53 0;
#X connect 42 0 31 0;
#X connect 43 0 28 0;
#X connect 43 0 30 0;
#X connect 44 0 1 0;
#X connect 44 0 3 0;
#X connect 45 0 0 0;
#X connect 46 0 3 0;
#X connect 46 0 47 0;
#X connect 47 0 53 0;
#X connect 48 0 3 0;
#X connect 48 0 1 0;
#X connect 49 0 5 0;
#X connect 51 0 28 0;
#X connect 51 0 30 0;
#X connect 52 0 0 0;
#X connect 53 0 25 0;
#X connect 53 1 26 0;
#X connect 53 2 37 0;
#X connect 53 3 45 0;
#X connect 53 4 52 0;
#X connect 54 0 53 0;
#X connect 55 0 54 0;
#X connect 55 0 3 0;
#X restore 359 806 pd make_file_name;
#N canvas 515 377 547 303 write_n_save_tables 0;
#X msg 15 153 write \$1;
#X obj 15 273 textfile;
#X symbolatom 15 123 50 0 0 0 - - -;
#X obj 15 33 r \$0-datafilename;
#X obj 45 183 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144 -1
-1;
#X obj 45 213 delay 2000;
#X obj 45 243 s \$0_reset_tab;
#X msg 15 93 set \$1;
#X obj 15 63 pack s;
#X obj 120 213 s \$0-filecounter;
#N canvas 1238 22 548 628 real_time_data 0;
#N canvas 729 109 308 267 reset_tab 0;
#X msg 0 191 0;
#X obj 179 193 cup;
#X msg 199 155 0;
#X obj 75 -5 inlet;
#X obj 160 25 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144 -1
-1;
#X obj 160 -5 r loadbang;
#X obj 179 223 s \$0-rt_dataindex;
#X obj 0 85 arraysize \$0-real_time_data;
#X obj 0 225 s \$0-rt_datavalue;
#X obj 160 55 t b b b;
#X obj 0 124 until;
#X obj 0 153 t b b;
#X connect 0 0 8 0;
#X connect 1 0 6 0;
#X connect 2 0 1 0;
#X connect 3 0 4 0;
#X connect 4 0 9 0;
#X connect 5 0 4 0;
#X connect 7 0 10 0;
#X connect 9 0 7 0;
#X connect 9 1 1 0;
#X connect 9 2 2 0;
#X connect 10 0 11 0;
#X connect 11 0 0 0;
#X connect 11 1 1 0;
#X restore -254 56 pd reset_tab;
#X msg -55 423 clear;
#X obj -235 483 f;
#X obj -202 483 + 1;
#X obj -235 453 until;
#X msg -190 453 0;
#X msg -235 543 add \$1;
#X obj -147 -14 r \$0-clrp;
#X obj -254 296 route 0;
#X obj -254 324 delay 100;
#X obj -254 353 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144
-1 -1;
#X obj 164 -14 r \$0-tglrtdatacap;
#X obj 69 -14 r \$0-setready;
#X msg -41 16 0;
#X obj -254 383 t b b b;
#X obj -84 206 s \$0-dispval;
#X obj -254 266 r \$0-tglrtdatacap;
#X obj -143 16 r \$0_reset_tab;
#X obj -254 -14 r \$0-setready;
#X obj 189 46 s \$0_reset_tab;
#X obj -254 116 r \$0-rtcap_nom;
#X obj 49 206 r \$0-rt_dataindex;
#X obj -55 583 outlet to textfile;
#X obj -254 583 outlet bang symbol;
#X obj -114 236 tabwrite \$0-real_time_data;
#X obj -235 423 arraysize \$0-real_time_data;
#X obj -235 513 tabread \$0-real_time_data;
#X obj 164 206 s \$0-real_time_data;
#X msg 164 176 resize \$1;
#X obj -143 176 f;
#X obj -41 86 t b b;
#X msg -143 56 0;
#X obj -114 146 r \$0-rt_y_wii_data;
#X obj -114 176 r \$0-rt_datavalue;
#X msg -173 206 100;
#X obj -254 236 s \$0-dispval;
#X msg -254 206 0;
#X obj -254 146 trigger bang b;
#X obj -254 176 delay 500;
#X obj 39 146 cup;
#X obj -41 56 metro 10;
#N canvas 1086 674 114 131 rt_rate 0;
```

```
#X obj -3 -6 r \$0-rt_rate;
#X obj -3 24 route 0 1 2;
#X obj -3 94 outlet;
#X msg -3 54 250;
#X msg 37 54 100;
#X msg 77 54 10;
#X connect 0 0 1 0;
#X connect 1 0 3 0;
#X connect 1 1 4 0;
#X connect 1 2 5 0;
#X connect 3 0 2 0;
#X connect 4 0 2 0;
#X connect 5 0 2 0;
#X restore 4 16 pd rt_rate;
#X obj 164 16 r \$0-reset_rtd;
#X msg 164 76 1;
#X connect 1 0 5 0;
#X connect 1 0 22 0;
#X connect 2 0 3 0;
#X connect 2 0 26 0;
#X connect 3 0 2 1;
#X connect 4 0 2 0;
#X connect 5 0 2 1;
#X connect 6 0 22 0;
#X connect 7 0 0 0;
#X connect 7 0 13 0;
#X connect 8 0 9 0;
#X connect 9 0 10 0;
#X connect 10 0 14 0;
#X connect 11 0 40 0;
#X connect 12 0 13 0;
#X connect 12 0 43 0;
#X connect 13 0 40 0;
#X connect 14 0 23 0;
#X connect 14 1 25 0;
#X connect 14 2 1 0;
#X connect 16 0 8 0;
#X connect 17 0 0 0;
#X connect 17 0 31 0;
#X connect 18 0 0 0;
#X connect 20 0 37 0;
#X connect 21 0 24 1;
#X connect 25 0 4 0;
#X connect 26 0 6 0;
#X connect 28 0 27 0;
#X connect 29 0 24 0;
#X connect 30 0 29 0;
#X connect 30 1 39 0;
#X connect 31 0 29 0;
#X connect 32 0 29 0;
#X connect 33 0 24 0;
#X connect 33 0 15 0;
#X connect 34 0 24 0;
#X connect 34 0 35 0;
#X connect 36 0 35 0;
#X connect 37 0 38 0;
#X connect 37 1 34 0;
#X connect 38 0 36 0;
#X connect 39 0 24 1;
#X connect 39 0 28 0;
#X connect 40 0 30 0;
#X connect 41 0 40 1;
#X connect 42 0 43 0;
#X connect 42 0 19 0;
#X connect 43 0 39 0;
#X connect 43 0 28 0;
#X restore -222 33 pd real_time_data;
#N canvas 840 22 595 699 sequential_data 0;
#X obj 106 176 route 1;
#X msg 106 216 0;
#N canvas 598 537 320 272 reset_tab 0;
#X obj 10 103 until;
#X msg 10 141 0;
#X obj 199 143 cup;
#X msg 226 105 0;
#X obj 10 15 inlet;
#X obj 64 43 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144 -1
-1;
#X obj 85 15 r loadbang;
#X obj 199 75 t b b;
#X obj 10 175 s \$0-sq_datavalue;
#X obj 199 173 s \$0-sq_dataindex;
#X obj 10 75 arraysize \$0-sequential_data;
#X obj 149 173 ==;
#X obj 149 203 route 1;
#X obj 149 233 s \$0-sq_array_empty;
#X connect 0 0 1 0;
#X connect 0 0 2 0;
#X connect 1 0 8 0;
#X connect 2 0 9 0;
#X connect 2 0 11 0;
#X connect 3 0 2 0;
#X connect 4 0 5 0;
#X connect 5 0 7 0;
#X connect 5 0 10 0;
#X connect 6 0 5 0;
#X connect 7 0 2 0;
#X connect 7 1 3 0;
#X connect 10 0 0 0;
#X connect 10 0 11 1;
#X connect 11 0 12 0;
#X connect 12 0 13 0;
#X restore -84 116 pd reset_tab;
#X msg -154 463 clear;
#X obj -334 523 f;
#X obj -301 523 + 1;
#X obj -334 493 until;
#X msg -289 493 0;
#X msg -334 583 add \$1;
#X obj -74 86 r \$0-clrp;
#X obj -353 336 route 0;
#X obj -353 364 delay 100;
#X obj -353 393 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144
-1 -1;
#X obj -353 306 r \$0-tglseqdatacap;
#X obj -313 126 r \$0-numbers;
#N canvas 190 492 158 270 seq_arrsize 0;
#X obj 0 45 cup;
#X obj 0 75 moses 2;
```

```
#X obj 0 105 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144 -1
-1;
#X msg 72 15 0;
#X obj 45 -15 t b b;
#X obj 0 135 outlet to arraysize;
#X obj 0 -75 inlet;
#X obj 45 -74 r \$0-setready;
#X obj 55 -44 r \$0_reset_tab;
#X connect 0 0 1 0;
#X connect 1 1 2 0;
#X connect 2 0 5 0;
#X connect 3 0 0 0;
#X connect 4 0 0 0;
#X connect 4 1 3 0;
#X connect 6 0 0 0;
#X connect 7 0 4 0;
#X connect 8 0 4 0;
#X restore -266 186 pd seq_arrsize;
#X obj -313 166 t f b;
#X obj -353 423 t b b b;
#X obj -223 36 r \$0-stroop_time;
#X obj 116 136 r \$0-tglseqdatacap;
#X obj -84 56 r \$0_reset_tab;
#X obj -101 26 r \$0-setready;
#X obj -154 633 outlet to textfile;
#X obj -353 633 outlet bang symbol;
#X obj -266 246 r \$0-sq_datavalue;
#N canvas 0 22 489 360 (subpatch) 0;
#X array \$0-sequential_data 1 float 0;
#X coords 0 11 1 0 200 140 1;
#X restore 12 496 graph;
#X obj -84 246 r \$0-sq_dataindex;
#X obj -84 206 + 1;
#X obj -266 216 s \$0-sq_arraysize;
#X obj -84 146 r \$0-sq_arraysize;
#X msg -196 96 set \$1;
#X msg -196 126 1180;
#X obj -223 96 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144
-1 -1;
#X obj -313 276 tabwrite \$0-sequential_data;
#X obj -334 463 arraysize \$0-sequential_data;
#X obj -334 553 tabread \$0-sequential_data;
#X obj -84 176 arraysize \$0-sequential_data;
#X msg 106 246 resize \$1;
#X obj 106 276 s \$0-sequential_data;
#X obj -323 66 r \$0-rndcolnum;
#X obj -223 66 t a a;
#X obj -323 96 * 100;
#X obj 136 216 s \$0_reset_tab;
#X obj -353 6 r \$0-stroop_index;
#X obj -353 36 expr ($f1-1)*1000;
#X obj 106 76 r loadbang;
#X msg 106 106 1;
#X connect 0 0 1 0;
#X connect 0 0 42 0;
#X connect 1 0 37 0;
#X connect 3 0 7 0;
#X connect 3 0 22 0;
#X connect 4 0 5 0;
#X connect 4 0 35 0;
#X connect 5 0 4 1;
#X connect 6 0 4 0;
#X connect 7 0 4 1;
#X connect 8 0 22 0;
#X connect 9 0 2 0;
#X connect 10 0 11 0;
#X connect 11 0 12 0;
#X connect 12 0 17 0;
#X connect 13 0 10 0;
#X connect 14 0 16 0;
#X connect 15 0 28 0;
#X connect 16 0 33 0;
#X connect 16 1 15 0;
#X connect 17 0 23 0;
#X connect 17 1 34 0;
#X connect 17 2 3 0;
#X connect 18 0 40 0;
#X connect 19 0 0 0;
#X connect 20 0 2 0;
#X connect 21 0 2 0;
#X connect 24 0 33 0;
#X connect 26 0 33 1;
#X connect 27 0 37 0;
#X connect 29 0 36 0;
#X connect 30 0 31 0;
#X connect 31 0 16 0;
#X connect 32 0 31 0;
#X connect 34 0 6 0;
#X connect 35 0 8 0;
#X connect 36 0 27 0;
#X connect 36 0 33 1;
#X connect 37 0 38 0;
#X connect 39 0 41 0;
#X connect 40 0 32 0;
#X connect 40 1 30 0;
#X connect 41 0 16 0;
#X connect 43 0 44 0;
#X connect 44 0 16 0;
#X connect 45 0 46 0;
#X connect 46 0 0 0;
#X restore -111 33 pd sequential_data;
#X text -225 3 WRITE TABLES:;
#X text 13 3 SAVE TABLES:;
#X connect 0 0 1 0;
#X connect 0 0 4 0;
#X connect 2 0 0 0;
#X connect 3 0 8 0;
#X connect 4 0 5 0;
#X connect 4 0 9 0;
#X connect 5 0 6 0;
#X connect 7 0 2 0;
#X connect 8 0 7 0;
#X connect 10 0 2 0;
#X connect 10 1 1 0;
#X connect 11 0 2 0;
#X connect 11 1 1 0;
#X restore 359 746 pd write_n_save_tables;
#N canvas 576 293 573 727 display_text_rows 0;
#X obj -262 132 msgfile;
```

```
#X obj -262 162 l2s;
#X obj 122 103 s txt_reset;
#X obj -241 362 bng 15 250 50 0 empty empty empty 0 -6 0 10 -262144
-1 -1;
#X obj -295 552 gate 5;
#X msg 102 552 0;
#X msg -218 552 4;
#X msg -138 552 3;
#X msg -58 552 2;
#X msg 22 552 1;
#X text 125 551 <-- v. offset;
#N canvas 275 304 439 229 one_line 0;
#X obj 108 192 text3d;
#X msg 48 71 text \$1;
#X obj 108 111 translateXYZ;
#X obj -92 11 loadbang;
#X msg -32 91 5;
#X obj 108 41 r gemchain;
#X msg -82 91 text;
#X msg -92 171 justify center;
#X obj 108 71 separator;
#X obj -32 11 r txt_reset;
#X obj 208 11 inlet v. offset;
#X obj 48 11 inlet text;
#X obj 268 41 r \$0-txtsize;
#X connect 1 0 0 0;
#X connect 2 0 0 0;
#X connect 3 0 7 0;
#X connect 3 0 6 0;
#X connect 3 0 4 0;
#X connect 4 0 0 1;
#X connect 5 0 8 0;
#X connect 6 0 0 0;
#X connect 7 0 0 0;
#X connect 8 0 2 0;
#X connect 9 0 6 0;
#X connect 10 0 2 2;
#X connect 11 0 1 0;
#X connect 12 0 0 1;
#X restore -281 622 pd one_line;
#N canvas 0 22 439 229 one_line 0;
#X obj 108 192 text3d;
#X msg 48 71 text \$1;
#X obj 108 111 translateXYZ;
#X obj -92 11 loadbang;
#X msg -32 91 5;
#X obj 108 41 r gemchain;
#X msg -82 91 text;
#X msg -92 171 justify center;
#X obj 108 71 separator;
#X obj -32 11 r txt_reset;
#X obj 208 11 inlet v. offset;
#X obj 48 11 inlet text;
#X obj 268 41 r \$0-txtsize;
#X connect 1 0 0 0;
#X connect 2 0 0 0;
#X connect 3 0 7 0;
#X connect 3 0 6 0;
#X connect 3 0 4 0;
#X connect 4 0 0 1;
#X connect 5 0 8 0;
#X connect 6 0 0 0;
#X connect 7 0 0 0;
#X connect 8 0 2 0;
#X connect 9 0 6 0;
#X connect 10 0 2 2;
#X connect 11 0 1 0;
#X connect 12 0 0 1;
#X restore -201 622 pd one_line;
#N canvas 693 446 439 229 one_line 0;
#X obj 108 192 text3d;
#X msg 48 71 text \$1;
#X obj 108 111 translateXYZ;
#X obj -92 11 loadbang;
#X msg -32 91 5;
#X obj 108 41 r gemchain;
#X msg -82 91 text;
#X obj 108 71 separator;
#X obj -32 11 r txt_reset;
#X obj 208 11 inlet v. offset;
#X obj 48 11 inlet text;
#X obj 268 41 r \$0-txtsize;
#X msg -92 171 justify center;
#X connect 1 0 0 0;
#X connect 2 0 0 0;
#X connect 3 0 12 0;
#X connect 3 0 6 0;
#X connect 3 0 4 0;
#X connect 4 0 0 1;
#X connect 5 0 7 0;
#X connect 6 0 0 0;
#X connect 7 0 2 0;
#X connect 8 0 6 0;
#X connect 9 0 2 2;
#X connect 10 0 1 0;
#X connect 11 0 0 1;
#X connect 12 0 0 0;
#X restore -121 622 pd one_line;
#N canvas 690 780 439 229 one_line 0;
#X obj 108 192 text3d;
#X msg 48 71 text \$1;
#X obj 108 111 translateXYZ;
#X obj -92 11 loadbang;
#X msg -32 91 5;
#X obj 108 41 r gemchain;
#X msg -82 91 text;
#X msg -92 171 justify center;
#X obj 108 71 separator;
#X obj -32 11 r txt_reset;
#X obj 208 11 inlet v. offset;
#X obj 48 11 inlet text;
#X obj 268 41 r \$0-txtsize;
#X connect 1 0 0 0;
#X connect 2 0 0 0;
#X connect 3 0 7 0;
#X connect 3 0 6 0;
#X connect 3 0 4 0;
#X connect 4 0 0 1;
#X connect 5 0 8 0;
```

```
#X connect 6 0 0 0;
#X connect 7 0 0 0;
#X connect 8 0 2 0;
#X connect 9 0 6 0;
#X connect 10 0 2 2;
#X connect 11 0 1 0;
#X connect 12 0 0 1;
#X restore -41 622 pd one_line;
#N canvas 659 466 439 229 one_line 0;
#X obj 108 192 text3d;
#X msg 48 71 text \$1;
#X obj 108 111 translateXYZ;
#X obj -92 11 loadbang;
#X msg -32 91 5;
#X obj 108 41 r gemchain;
#X msg -82 91 text;
#X msg -92 171 justify center;
#X obj 108 71 separator;
#X obj -32 11 r txt_reset;
#X obj 208 11 inlet v. offset;
#X obj 48 11 inlet text;
#X obj 268 41 r \$0-txtsize;
#X connect 1 0 0 0;
#X connect 2 0 0 0;
#X connect 3 0 7 0;
#X connect 3 0 6 0;
#X connect 3 0 4 0;
#X connect 4 0 0 1;
#X connect 5 0 8 0;
#X connect 6 0 0 0;
#X connect 7 0 0 0;
#X connect 8 0 2 0;
#X connect 9 0 6 0;
#X connect 10 0 2 2;
#X connect 11 0 1 0;
#X connect 12 0 0 1;
#X restore 39 622 pd one_line;
#X obj -123 332 s \$0-txt_colour;
#X obj -203 332 s \$0-txtsize;
#X obj -123 272 spigot;
#X obj -203 272 spigot;
#X obj -203 302 unpack f;
#X obj -54 102 s \$0-gemon;
#X obj -163 52 s \$0-gemoff;
#X msg 102 282 3;
#X obj -295 -68 r \$0-disptxt;
#X obj 83 -68 r \$0-stroop_txt;
#X obj -70 192 r \$0-rnd_colour;
#X obj -41 -8 pack s;
#X obj 83 22 l2s;
#X obj -295 -38 route off on;
#X obj -81 52 t b b;
#X obj -295 -8 t bang bang;
#X obj 83 52 t a a b;
#X obj -41 22 t a b b;
#X obj -81 161 s \$0-disptxt_done;
#X obj -81 131 delay 1;
#X obj -262 192 t a a a;
#X obj -123 242 list trim;
#N canvas 1255 142 519 447 disptxt_lines_loader 0;
#X obj -120 126 bng 15 250 50 0 empty empty next_line 20 8 0 10 -262144
-1 -1;
#X obj 27 186 cup;
#X obj -120 156 t b b;
#X obj 147 226 route 5;
#X msg -120 66 0;
#X obj 147 256 s \$0-stop_load;
#X obj -120 6 r \$0-stop_load;
#X obj -243 346 outlet line_number;
#X msg 47 6 read \$1;
#X msg 66 86 rewind;
#X obj 47 36 t a a a;
#X obj 47 -54 inlet file name;
#X msg 27 66 -1;
#X obj 27 346 outlet spgt_size;
#X obj 147 346 outlet spgt_colour;
#X obj -120 346 outlet to msgfile;
#X msg 147 317 1;
#X msg 186 317 0;
#X msg 27 317 1;
#X msg 72 317 0;
#X obj -243 216 s \$0-disptxt_done;
#X obj 147 286 route 0;
#X obj 27 286 route -1;
#X text -239 -58 Opens a .txt file containing:;
#X text -238 34 (up to 5 lines);
#X text -239 -38 colour(r \, y \, g \, b \, p \, w) \; size \; line
1 \; line 2 \; line 3 \;;
#N canvas 420 618 364 195 add_path_n_filename 0;
#X obj 250 -28 inlet;
#X obj 232 122 outlet;
#X obj 7 -28 r \$0-prg_path;
#X msg 7 32 symbol /Users/juigmend/Desktop/Experiment 3/Experiment_3_Data_Recording
;
#X msg 7 2 set symbol \$1;
#X obj 232 62 pack s s;
#X obj 277 32 l2s;
#X obj 232 92 makesymbol %s/%s;
#X obj 250 2 t a a;
#X obj 107 -28 r loadbang;
#X msg 107 2 set;
#X connect 0 0 8 0;
#X connect 2 0 4 0;
#X connect 3 0 5 0;
#X connect 4 0 3 0;
#X connect 5 0 7 0;
#X connect 6 0 5 1;
#X connect 7 0 1 0;
#X connect 8 0 3 0;
#X connect 8 1 6 0;
#X connect 9 0 10 0;
#X connect 10 0 3 0;
#X restore 47 -24 pd add_path_n_filename;
#X obj 136 116 s \$0-to_msgfile_l;
#X obj -110 286 r \$0-to_msgfile_l;
#X obj -120 96 metro 10;
#X connect 0 0 2 0;
#X connect 1 0 3 0;
#X connect 1 0 7 0;
```

```
#X connect 1 0 21 0;
#X connect 1 0 22 0;
#X connect 2 0 15 0;
#X connect 2 1 1 0;
#X connect 3 0 5 0;
#X connect 4 0 29 0;
#X connect 6 0 4 0;
#X connect 6 0 20 0;
#X connect 8 0 10 0;
#X connect 9 0 27 0;
#X connect 10 0 12 0;
#X connect 10 1 9 0;
#X connect 10 2 27 0;
#X connect 11 0 26 0;
#X connect 12 0 1 0;
#X connect 12 0 29 0;
#X connect 16 0 14 0;
#X connect 17 0 14 0;
#X connect 18 0 13 0;
#X connect 19 0 13 0;
#X connect 21 0 16 0;
#X connect 21 1 17 0;
#X connect 22 0 18 0;
#X connect 22 1 19 0;
#X connect 26 0 8 0;
#X connect 28 0 15 0;
#X connect 29 0 0 0;
#X restore -295 82 pd disptxt_lines_loader;
#X obj 115 -38 r $v_disptxt_count_text1;
#X obj 102 322 r $v_disptxt_count_text2;
#X msg 129 412 4;
#X obj 142 22 s \$0-gemon;
#X obj 115 -8 t a b;
#X obj 102 352 l2s;
#X obj 102 382 t a a;
#X connect 0 0 1 0;
#X connect 0 0 19 0;
#X connect 1 0 36 0;
#X connect 3 0 7 0;
#X connect 3 0 8 0;
#X connect 3 0 9 0;
#X connect 3 0 5 0;
#X connect 3 0 6 0;
#X connect 4 0 11 0;
#X connect 4 1 12 0;
#X connect 4 2 13 0;
#X connect 4 3 14 0;
#X connect 4 4 15 0;
#X connect 5 0 15 1;
#X connect 6 0 11 1;
#X connect 7 0 12 1;
#X connect 8 0 13 1;
#X connect 9 0 14 1;
#X connect 18 0 16 0;
#X connect 19 0 20 0;
#X connect 20 0 17 0;
#X connect 23 0 8 0;
#X connect 23 0 4 0;
#X connect 24 0 29 0;
#X connect 25 0 28 0;
#X connect 26 0 16 0;
#X connect 27 0 33 0;
#X connect 28 0 32 0;
#X connect 29 0 31 0;
#X connect 29 1 30 0;
#X connect 29 2 27 0;
#X connect 30 0 35 0;
#X connect 30 1 21 0;
#X connect 30 1 2 0;
#X connect 31 0 35 0;
#X connect 31 1 22 0;
#X connect 32 0 13 0;
#X connect 32 0 8 0;
#X connect 32 1 23 0;
#X connect 32 2 2 0;
#X connect 33 0 38 0;
#X connect 33 1 21 0;
#X connect 33 2 2 0;
#X connect 35 0 34 0;
#X connect 36 0 4 1;
#X connect 36 1 3 0;
#X connect 36 2 37 0;
#X connect 37 0 18 0;
#X connect 38 0 4 0;
#X connect 38 1 0 0;
#X connect 38 2 19 1;
#X connect 38 3 18 1;
#X connect 39 0 43 0;
#X connect 40 0 44 0;
#X connect 41 0 9 0;
#X connect 41 0 4 0;
#X connect 43 0 28 0;
#X connect 43 1 42 0;
#X connect 44 0 45 0;
#X connect 45 0 9 0;
#X connect 45 0 14 0;
#X connect 45 1 41 0;
#X restore 360 643 pd display_text_rows;
#N canvas 583 326 208 609 txt_qst 0;
#X text -95 -190 --------------------------------;
#X text -95 310 --------------------------------;
#X text -91 326 TXT_QST DATA RECORDING:;
#X text -91 -178 TXT_QST LOAD & DISPLAY:;
#N canvas 1114 297 553 601 txt_qst_flush_machine 0;
#N canvas 558 22 539 214 \$0-txt_qst_flush_memory 0;
#X obj 300 10 s txt_qst_fl;
#X restore 167 541 pd \$0-txt_qst_flush_memory;
#X obj 213 -28 r \$0-new_txtqst;
#X msg 373 32 clear;
#X obj 213 62 s pd-\$0-txt_qst_flush_memory;
#X obj 56 -30 r \$0-txt_qst_del_num;
#X obj -62 160 r dl-select_disp;
#X obj -62 190 s2l;
#X obj -62 340 s2l;
#X obj -62 310 r dn-select_disp;
#X obj -88 -30 r de_cap_a;
#X obj -128 30 r de_cap_b;
#X obj -62 220 unpack f f f;
#X obj -62 370 unpack f f f;
```

```
#X obj -128 60 unpack f s f f;
#X obj -88 0 route bang;
#X obj -62 280 pack f s;
#X obj -31 30 l2s;
#X obj -62 101 f;
#X obj -31 60 t b s;
#X msg 113 30 symbol $;
#X obj 113 60 makesymbol %s1;
#X obj 56 90 pack f f s;
#X obj 56 0 t f f b;
#X msg 250 150 obj 10 \$2 r flin_\$1;
#N canvas 1062 515 479 251 fl_connector 0;
#X obj 175 203 outlet 3rd;
#X obj 251 203 outlet 2nd;
#X obj 326 203 outlet 1st;
#X obj 91 -7 inlet;
#X obj 251 173 pack f f;
#X obj 100 173 pack f f;
#X obj 100 203 outlet 4th;
#X obj 25 203 outlet 5th;
#X obj 326 173 pack f f;
#X msg 91 23 \$1;
#X obj 175 173 pack f f;
#X obj -51 143 outlet 6th;
#X obj 91 83 t f f f f f f f f f f f;
#X obj 91 53 * 6;
#X obj 371 143 - 4;
#X obj 326 143 - 5;
#X obj 296 143 - 3;
#X obj 251 143 - 4;
#X obj 175 143 - 3;
#X obj 145 143 - 1;
#X obj 100 143 - 2;
#X obj 25 173 pack f f;
#X obj 25 143 - 1;
#X connect 3 0 9 0;
#X connect 4 0 1 0;
#X connect 5 0 6 0;
#X connect 8 0 2 0;
#X connect 9 0 13 0;
#X connect 10 0 0 0;
#X connect 12 0 11 0;
#X connect 12 1 22 0;
#X connect 12 2 21 1;
#X connect 12 3 20 0;
#X connect 12 4 19 0;
#X connect 12 5 18 0;
#X connect 12 6 10 1;
#X connect 12 7 17 0;
#X connect 12 8 16 0;
#X connect 12 9 15 0;
#X connect 12 10 14 0;
#X connect 13 0 12 0;
#X connect 14 0 8 1;
#X connect 15 0 8 0;
#X connect 16 0 4 1;
#X connect 17 0 4 0;
#X connect 18 0 10 0;
#X connect 19 0 5 1;
#X connect 20 0 5 0;
#X connect 21 0 7 0;
#X connect 22 0 21 0;
#X restore 70 239 pd fl_connector;
#X msg 250 329 connect \$1 0 \$2 0;
#X msg 250 359 connect \$1 0 \$2 0;
#X msg 250 389 connect \$1 0 \$2 0;
#X msg 250 419 connect \$1 0 \$2 0;
#X obj 167 511 s pd-\$0-txt_qst_flush_memory;
#X obj 75 60 * 40;
#X msg 250 209 msg 120 \$2 set \$3;
#X obj 7 250 l2s;
#X obj 7 401 l2s;
#X msg 250 178 obj 70 \$2 symbol;
#X msg 213 32 obj 300 10 s txt_qst_fl;
#X msg -128 461 \; flin_\$1 \$2;
#X obj -62 431 pack f s;
#X obj -62 131 pack f s;
#N canvas 511 664 263 312 flusher 0;
#X obj -107 8 inlet trigger flush;
#X obj 22 68 r \$0-new_txtqst;
#X obj -33 158 r \$0-txt_qst_del_num;
#X msg -107 68 1;
#X msg -46 68 0;
#X obj -48 188 ==;
#X obj -48 214 select 1;
#X msg -68 274 \; flout_\$1 bang;
#X obj -48 244 s \$0-fl_stopflushing;
#X obj 22 38 r \$0-fl_stopflushing;
#X msg -46 98 0;
#X obj -107 128 cup;
#X obj -107 158 route 0;
#X obj -107 98 metro 10;
#N canvas 214 22 286 380 check 0;
#X obj -94 -21 r txt_qst_fl;
#X obj -94 69 list trim;
#X obj -94 99 route symbolempty;
#X obj -122 249 outlet flush;
#X obj -122 -101 inlet trigger flush;
#X obj 19 189 s \$0-txtqst_clearfile;
#X obj 3 219 s \$0-txtqst_writefile;
#X msg -103 129 1;
#X msg -14 129 2;
#X obj -24 249 s \$0-txt_qst_flcont;
#X obj -24 189 t b b;
#X obj -14 159 gate 2;
#X obj 34 69 r \$0-txt_qst_del_num;
#X obj 19 99 ==;
#X obj 19 129 select 1;
#X obj -20 39 cup;
#X obj -20 69 route 0;
#X obj 50 -21 r \$0-new_txtqst;
#X obj -20 9 bang;
#X msg 50 9 1;
#X obj -122 -71 t b b b;
#X connect 0 0 1 0;
#X connect 0 0 18 0;
#X connect 1 0 2 0;
#X connect 2 0 8 0;
#X connect 4 0 20 0;
```

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#X connect 7 0 11 0;
#X connect 8 0 11 0;
#X connect 10 0 9 0;
#X connect 10 1 6 0;
#X connect 11 0 10 0;
#X connect 11 1 5 0;
#X connect 12 0 13 1;
#X connect 13 0 14 0;
#X connect 14 0 11 1;
#X connect 15 0 16 0;
#X connect 16 1 13 0;
#X connect 17 0 19 0;
#X connect 18 0 15 0;
#X connect 19 0 15 0;
#X connect 20 0 3 0;
#X connect 20 1 7 0;
#X connect 20 2 19 0;
#X restore -107 38 pd check responses;
#X connect 0 0 14 0;
#X connect 1 0 10 0;
#X connect 2 0 5 1;
#X connect 3 0 13 0;
#X connect 4 0 10 0;
#X connect 4 0 13 0;
#X connect 5 0 6 0;
#X connect 6 0 8 0;
#X connect 9 0 4 0;
#X connect 10 0 11 0;
#X connect 11 0 12 0;
#X connect 12 1 5 0;
#X connect 12 1 7 0;
#X connect 13 0 11 0;
#X connect 14 0 3 0;
#X restore 56 511 pd flusher;
#X msg 250 239 obj 170 \$2 r flout_\$1;
#X msg 250 269 obj 240 \$2 bng;
#X msg 250 299 symbolatom 270 \$2 40;
#X msg 250 479 connect \$1 0 0 0;
#X msg 250 449 connect \$1 0 \$2 0;
#X obj 76 481 bng 15 250 50 0 empty empty flush! 17 7 0 10 -262144
-1 -1;
#X obj 56 451 r snd-flushbtn;
#X obj 56 117 t l l l l l l l l;
#X msg 56 406 \; flin_\$1 symbolempty;
#X obj 213 2 t b b;
#X connect 1 0 49 0;
#X connect 2 0 3 0;
#X connect 4 0 22 0;
#X connect 5 0 6 0;
#X connect 6 0 11 0;
#X connect 7 0 12 0;
#X connect 8 0 7 0;
#X connect 9 0 14 0;
#X connect 10 0 13 0;
#X connect 11 0 15 0;
#X connect 11 2 32 0;
#X connect 12 0 37 0;
#X connect 12 2 33 0;
#X connect 13 3 17 1;
#X connect 14 1 16 0;
#X connect 15 0 36 0;
#X connect 16 0 18 0;
#X connect 17 0 38 0;
#X connect 18 0 17 0;
#X connect 18 1 38 1;
#X connect 19 0 20 0;
#X connect 20 0 21 2;
#X connect 21 0 47 0;
#X connect 22 0 21 0;
#X connect 22 1 30 0;
#X connect 22 2 19 0;
#X connect 23 0 29 0;
#X connect 24 0 43 0;
#X connect 24 1 44 0;
#X connect 24 2 28 0;
#X connect 24 3 27 0;
#X connect 24 4 26 0;
#X connect 24 5 25 0;
#X connect 25 0 29 0;
#X connect 26 0 29 0;
#X connect 27 0 29 0;
#X connect 28 0 29 0;
#X connect 30 0 21 1;
#X connect 31 0 29 0;
#X connect 32 0 15 1;
#X connect 33 0 37 1;
#X connect 34 0 29 0;
#X connect 35 0 3 0;
#X connect 37 0 36 0;
#X connect 38 0 36 0;
#X connect 40 0 29 0;
#X connect 41 0 29 0;
#X connect 42 0 29 0;
#X connect 43 0 29 0;
#X connect 44 0 29 0;
#X connect 45 0 39 0;
#X connect 46 0 39 0;
#X connect 47 0 48 0;
#X connect 47 1 24 0;
#X connect 47 2 42 0;
#X connect 47 3 41 0;
#X connect 47 4 40 0;
#X connect 47 5 31 0;
#X connect 47 6 34 0;
#X connect 47 7 23 0;
#X connect 49 0 35 0;
#X connect 49 1 2 0;
#X restore -92 355 pd txt_qst_flush_machine;
#N canvas 530 22 224 265 txt_qst_file_maker 0;
#X msg -78 177 add \$1;
#X msg -68 89 write \$1;
#X obj -68 59 symbol;
#X obj -1 119 r \$0-new_txtqst;
#X msg -1 179 clear;
#X obj 2 0 r \$0-datafilename;
#X obj 2 30 pack s;
#X obj -68 29 delay 1;
#X obj -1 209 textfile;
#X obj -1 89 s \$0-filecounter;
```

```
#X obj 9 149 r \$0-txtqst_clearfile;
#X obj 2 -30 r \$0-txtqst_writefile;
#X obj -78 -31 r txt_qst_fl;
#X connect 0 0 8 0;
#X connect 1 0 8 0;
#X connect 2 0 1 0;
#X connect 2 0 9 0;
#X connect 3 0 4 0;
#X connect 4 0 8 0;
#X connect 5 0 6 0;
#X connect 6 0 2 1;
#X connect 7 0 2 0;
#X connect 10 0 4 0;
#X connect 11 0 7 0;
#X connect 12 0 0 0;
#X restore -92 385 pd txt_qst_file_maker;
#N canvas 858 481 567 360 open_txt_qst_screen 0;
#X obj -80 -98 f \$0;
#X obj -160 -128 key;
#X obj -160 -98 route 27;
#X msg -117 -8 1;
#X obj 220 67 f \$0;
#X obj 220 97 pack f f;
#X msg 220 -3 1;
#X msg 265 -3 0;
#X obj 220 37 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144 -1
-1;
#X obj -61 -8 window_name pd-\$0-txt_qst_screen;
#X obj -80 -158 route 1 0;
#X obj -80 -188 r \$0-openclose_txt_qst_screen;
#X msg 220 127 \; pd-\$1-txt_qst_screen vis \$2;
#X msg 120 -123 clear;
#X obj 120 -93 s pd-\$0-txt_qst_screen;
#X obj -160 -68 t b b;
#X obj -160 97 sys_gui;
#X obj -160 22 pack float symbol;
#X msg -160 -8 0;
#X obj 265 -188 r \$0-clrp;
#X msg -160 127 wm attributes \$2 -fullscreen \$1 \, wm resizable \$2
\$1 \$1 \, wm attributes \$2 -topmost \$1;
#X obj -80 -68 t b b a;
#X obj -80 -128 bang;
#X msg -160 52 wm attributes \$2 -fullscreen 1 \, wm resizable \$2
0 0 \, wm attributes \$2 -topmost 1;
#X connect 0 0 21 0;
#X connect 1 0 2 0;
#X connect 3 0 17 0;
#X connect 4 0 5 0;
#X connect 5 0 12 0;
#X connect 6 0 5 1;
#X connect 6 0 8 0;
#X connect 7 0 5 1;
#X connect 7 0 8 0;
#X connect 8 0 4 0;
#X connect 9 0 17 1;
#X connect 10 0 22 0;
#X connect 10 1 13 0;
#X connect 10 1 7 0;
#X connect 11 0 10 0;
#X connect 13 0 14 0;
#X connect 15 0 18 0;
#X connect 15 1 9 0;
#X connect 17 0 23 0;
#X connect 18 0 17 0;
#X connect 19 0 13 0;
#X connect 19 0 7 0;
#X connect 21 0 3 0;
#X connect 21 1 9 0;
#X connect 21 2 6 0;
#X connect 22 0 0 0;
#X connect 23 0 16 0;
#X restore -92 -59 pd open_txt_qst_screen;
#N canvas 0 -22 1680 1035 \$0-txt_qst_screen 0;
#X restore -92 -89 pd \$0-txt_qst_screen;
#N canvas 778 22 255 448 txt_qst_dynamic_likert 0;
#X obj -114 -41 r \$0-dl_offset;
#X obj -114 -1 +;
#X text -79 -123 Likert selection:;
#X obj -129 -61 r \$0-dl_makeone;
#N canvas 147 22 814 417 likert_device 0;
#X obj 255 -38 inlet range;
#X msg 13 171 0;
#X msg -20 171 1;
#X obj -79 321 s \$0-dl-label;
#X obj -79 291 l2s;
#X obj 355 -39 inlet parameters_for_one_tgl;
#X obj -79 251 cup;
#X obj 162 91 r \$0-dl-label;
#X obj -79 111 f;
#X obj 309 201 s \$0-dl-value;
#X obj 294 261 *;
#X msg 309 231 40;
#X obj 294 291 s \$0-dl_offset;
#X obj 125 231 ==;
#X obj 125 271 select 1;
#X obj 125 141 cup;
#X msg 125 111 1;
#X obj 125 171 t f f f;
#X obj 233 201 t b f b;
#X obj 243 321 s \$0-dl_makeone;
#X obj 233 261 delay 1;
#X obj 13 201 metro 2;
#X obj 13 111 s dl-select_disp;
#X obj 255 152 s \$0-dl-range;
#X obj 125 301 s \$0-dl-done;
#X obj 13 141 r \$0-dl-done;
#N canvas 0 22 267 186 verify_pos 0;
#X obj 40 -48 inlet;
#X obj 144 102 outlet bng_error;
#X obj 44 102 outlet pos_num;
#X obj 144 12 <= 0;
#X obj 144 42 select 1;
#X obj 44 72 f;
#X obj 4 42 select 1;
#X obj 4 12 >= 1;
#X obj 40 -18 t f f f;
#X connect 0 0 8 0;
#X connect 3 0 4 0;
#X connect 4 0 1 0;
```

```
#X connect 5 0 2 0;
#X connect 6 0 5 0;
#X connect 7 0 6 0;
#X connect 8 0 7 0;
#X connect 8 1 5 1;
#X connect 8 2 3 0;
#X restore 255 -8 pd verify_pos;
#X obj 330 91 print likert;
#X msg 330 61 range must be a positive number!;
#X obj 140 201 r \$0-dl-range;
#X obj 162 11 loadbang;
#X obj 355 30 s pd-\$0-txt_qst_screen;
#X obj 32 -38 r \$0-txt_qst_dl_trig;
#X obj -64 -39 r \$0-dl-lonum;
#X msg 162 41 clear;
#X obj 162 61 s \$0-dl-clear;
#X obj 32 -8 t bang bang;
#X msg 355 -10 obj \$2 \$3 toggle \$4 1 sdl-\$5 rdl-\$5_\$6 \$10 \$7
\$8 0 \$9 10 -1 -1 0 \$6;
#X obj 481 231 route 0;
#X obj 436 151 r dl-select;
#X obj 43 301 s \$0-q_cont;
#X obj -49 -8 s \$0-q_stop;
#X obj 121 -8 r \$0-new_txtqst;
#N canvas 625 457 390 405 likert_selection_machine 0;
#X obj 231 94 r \$0-dl-clear;
#X msg 60 154 floatatom 10 \$3 2 0 0 0 - sdl-\$2;
#X obj 44 24 * 30;
#X obj 83 -6 * 3;
#X msg 26 214 connect \$4 0 \$5 0;
#X msg 147 -6 symbol $;
#X obj 147 24 makesymbol %s1;
#X msg 231 -36 obj 120 20 s dl-select;
#X obj 9 -65 t b f f f b b;
#X msg 9 244 connect \$5 0 0 0;
#X obj 83 24 - 2;
#X obj 113 24 - 1;
#X obj 9 124 t l l l l;
#X obj 9 -95 r \$0-dl_num;
#X obj 247 24 r \$0-dl-range;
#X obj 231 125 s pd-dl_select_receiver;
#N canvas 1264 23 204 449 dl_select_receiver 0;
#X coords 0 0 1 1 60 60 0;
#X restore 9 274 pd dl_select_receiver;
#X obj 231 184 s pd-dl_select_receiver;
#X obj 231 215 s pd-dl_select_receiver;
#X obj 231 244 s pd-dl_select_receiver;
#X obj 231 274 s pd-dl_select_receiver;
#X obj 231 -6 s pd-dl_select_receiver;
#X obj 231 54 r \$0-txt_qst_del_num;
#X obj 9 94 pack f f f f f s f f;
#X msg 43 184 msg 30 \$3 \$2 \$7 \$6 \$8;
#X connect 0 0 15 0;
#X connect 1 0 17 0;
#X connect 2 0 23 2;
#X connect 3 0 10 0;
#X connect 3 0 11 0;
#X connect 4 0 19 0;
#X connect 5 0 6 0;
#X connect 6 0 23 5;
#X connect 7 0 21 0;
#X connect 8 0 23 0;
#X connect 8 1 23 1;
#X connect 8 2 2 0;
#X connect 8 3 3 0;
#X connect 8 4 5 0;
#X connect 8 5 7 0;
#X connect 9 0 20 0;
#X connect 10 0 23 3;
#X connect 11 0 23 4;
#X connect 12 0 9 0;
#X connect 12 1 4 0;
#X connect 12 2 24 0;
#X connect 12 3 1 0;
#X connect 13 0 8 0;
#X connect 14 0 23 6;
#X connect 22 0 23 7;
#X connect 23 0 12 0;
#X connect 24 0 18 0;
#X restore 418 91 pd likert_selection_machine;
#N canvas 7 213 585 635 likert_selection_displayer 0;
#X obj 144 536 ==;
#X obj 144 566 select 1;
#X obj 144 445 cup;
#X obj 144 476 t f f;
#X obj 305 536 pack f f;
#X obj 272 506 select;
#X msg 74 385 0;
#X obj 144 597 s \$0-dl-stopsetsel;
#X obj 74 355 r \$0-dl-stopsetsel;
#X obj 227 106 spigot;
#X obj 266 355 t b b f;
#X msg 307 75 1;
#X msg 260 75 0;
#X obj 214 566 loadbang;
#X msg 305 566 \; rdl-\$2_\$1 0;
#X obj 16 327 s \$0-selec_l_index;
#X obj 139 327 s \$0-selec_range;
#X obj 350 506 r \$0-selec_l_index;
#X obj 159 506 r \$0-selec_range;
#X obj -27 -5 inlet likert index;
#X obj 273 -5 inlet button index;
#X msg 144 415 1;
#X obj 74 415 metro 10;
#X obj 96 -5 inlet range for this likert;
#X obj 16 297 f;
#X obj 139 297 f;
#X obj 266 325 f;
#X obj 228 205 delay 10;
#X obj 228 235 t b b b;
#X obj 307 45 r \$0-dl-stopsetsel;
#N canvas 295 393 171 159 unique_number 0;
#X obj 58 96 sel 1;
#X obj 133 38 f;
#X obj 3 38 f;
#X obj 58 8 t f b;
#X obj 58 68 expr $f1!=$f2;
#X obj 58 -22 inlet;
#X obj 3 96 outlet;
```

```
#X connect 0 0 2 0;
#X connect 1 0 4 1;
#X connect 2 0 1 1;
#X connect 2 0 6 0;
#X connect 3 0 2 1;
#X connect 3 0 4 0;
#X connect 3 1 1 0;
#X connect 4 0 0 0;
#X connect 5 0 3 0;
#X restore -25 495 pd unique_number;
#X obj 392 445 s dl-select_disp;
#X obj 392 415 l2s;
#X obj 397 -5 inlet data capture num;
#X obj 227 136 unpack f f f f;
#X obj 227 45 pack f f f f;
#X obj 368 205 pack f f f;
#X obj 368 235 unpack f f f;
#X obj 368 325 pack f f f f;
#X obj 368 275 t b f;
#X obj 368 355 unpack f f f f;
#X obj 392 385 pack f f f;
#X connect 0 0 1 0;
#X connect 1 0 7 0;
#X connect 2 0 3 0;
#X connect 3 0 0 0;
#X connect 3 1 5 0;
#X connect 4 0 14 0;
#X connect 5 1 4 0;
#X connect 6 0 22 0;
#X connect 8 0 6 0;
#X connect 8 0 21 0;
#X connect 9 0 12 0;
#X connect 9 0 34 0;
#X connect 10 0 22 0;
#X connect 10 1 21 0;
#X connect 10 2 5 1;
#X connect 11 0 9 1;
#X connect 12 0 9 1;
#X connect 13 0 7 0;
#X connect 17 0 4 1;
#X connect 18 0 0 1;
#X connect 19 0 35 0;
#X connect 20 0 35 2;
#X connect 21 0 2 0;
#X connect 22 0 2 0;
#X connect 23 0 35 1;
#X connect 24 0 15 0;
#X connect 25 0 16 0;
#X connect 26 0 10 0;
#X connect 27 0 28 0;
#X connect 28 0 26 0;
#X connect 28 1 25 0;
#X connect 28 2 24 0;
#X connect 29 0 11 0;
#X connect 32 0 31 0;
#X connect 33 0 35 3;
#X connect 34 0 24 1;
#X connect 34 0 36 0;
#X connect 34 1 25 1;
#X connect 34 2 26 1;
#X connect 34 2 27 0;
#X connect 34 2 36 1;
#X connect 34 3 36 2;
#X connect 35 0 9 0;
#X connect 36 0 37 0;
#X connect 37 0 39 0;
#X connect 37 1 38 3;
#X connect 37 2 38 1;
#X connect 38 0 40 0;
#X connect 39 0 38 0;
#X connect 39 1 38 2;
#X connect 40 1 41 0;
#X connect 40 2 41 1;
#X connect 40 3 41 2;
#X connect 41 0 32 0;
#X restore 406 261 pd likert_selection_displayer;
#X obj 162 111 bang;
#X obj 233 351 s \$0-txt_qst_cel_count;
#X obj 436 201 unpack f f f f;
#X msg 13 91 symbol;
#X connect 0 0 26 0;
#X connect 1 0 21 0;
#X connect 2 0 21 0;
#X connect 4 0 3 0;
#X connect 5 0 37 0;
#X connect 6 0 4 0;
#X connect 7 0 45 0;
#X connect 8 0 6 0;
#X connect 8 0 2 0;
#X connect 10 0 12 0;
#X connect 11 0 10 1;
#X connect 13 0 14 0;
#X connect 14 0 24 0;
#X connect 14 0 40 0;
#X connect 15 0 17 0;
#X connect 16 0 15 0;
#X connect 17 0 13 0;
#X connect 17 1 18 0;
#X connect 17 2 9 0;
#X connect 18 0 20 0;
#X connect 18 1 10 0;
#X connect 18 2 11 0;
#X connect 20 0 19 0;
#X connect 20 0 46 0;
#X connect 21 0 6 0;
#X connect 25 0 1 0;
#X connect 26 0 23 0;
#X connect 26 1 28 0;
#X connect 28 0 27 0;
#X connect 29 0 13 1;
#X connect 30 0 48 0;
#X connect 30 0 34 0;
#X connect 32 0 36 0;
#X connect 32 0 41 0;
#X connect 33 0 8 1;
#X connect 34 0 35 0;
#X connect 36 0 8 0;
#X connect 36 1 16 0;
#X connect 37 0 31 0;
```

```
#X connect 38 1 44 2;
#X connect 39 0 47 0;
#X connect 42 0 48 0;
#X connect 42 0 34 0;
#X connect 45 0 15 0;
#X connect 47 0 44 0;
#X connect 47 1 44 1;
#X connect 47 2 38 0;
#X connect 47 3 44 3;
#X connect 48 0 22 0;
#X restore -139 208 pd likert_device;
#X symbolatom 28 -123 8 0 0 0 - dl-select_disp foooooo;
#X obj -99 -21 r \$0-txt_qst_hpos;
#X obj -82 39 r \$0-q_fontsize;
#X obj -98 19 r \$0-txt_qst_vpos;
#X obj -149 -191 r \$0-txt_qst_dl_param;
#X obj -149 -111 unpack f f;
#X obj -149 -131 fromsymbol;
#N canvas 181 372 148 170 range_processor 0;
#X obj 3 102 outlet;
#X obj 3 -28 inlet;
#X obj 84 -28 inlet;
#X obj 3 42 abs;
#X obj 3 72 + 1;
#X obj 3 12 expr $f1 - $f2;
#X connect 1 0 5 0;
#X connect 2 0 5 1;
#X connect 3 0 4 0;
#X connect 4 0 0 0;
#X connect 5 0 3 0;
#X restore -139 -81 pd range_processor;
#X msg -35 99 6;
#X msg -20 119 12;
#X obj -4 139 r \$0-q_fontsize;
#X obj -51 79 r \$0-dl-value;
#X text -10 99 label-x;
#X text 5 119 label-y;
#X obj -82 119 + 10;
#X obj -129 181 pack f f f f f f f f f s;
#X obj 12 159 r \$0-dl-label;
#X obj -149 228 s \$0-dl-lonum;
#N canvas 1368 651 171 155 dl_makenum 0;
#X obj -66 5 inlet;
#X obj 41 24 loadbang;
#X obj -66 95 cup;
#X obj -66 125 s \$0-dl_num;
#X msg -66 65 bang;
#X msg -25 65 1;
#X obj -25 5 r \$0-new_txtqst;
#X connect 0 0 4 0;
#X connect 1 0 5 0;
#X connect 2 0 3 0;
#X connect 4 0 2 0;
#X connect 5 0 2 0;
#X connect 6 0 5 0;
#X restore -101 -161 pd dl_makenum;
#X obj -67 59 r \$0-dl_num;
#X connect 0 0 1 0;
#X connect 1 0 20 1;
#X connect 3 0 20 0;
#X connect 6 0 1 1;
#X connect 7 0 19 0;
#X connect 8 0 20 2;
#X connect 9 0 11 0;
#X connect 9 0 13 0;
#X connect 9 0 23 0;
#X connect 10 0 12 0;
#X connect 10 0 22 0;
#X connect 10 1 12 1;
#X connect 11 0 10 0;
#X connect 12 0 4 0;
#X connect 13 0 14 0;
#X connect 13 0 20 6;
#X connect 14 0 20 7;
#X connect 15 0 20 8;
#X connect 16 0 20 5;
#X connect 19 0 20 3;
#X connect 20 0 4 1;
#X connect 21 0 20 9;
#X connect 24 0 20 4;
#X restore -92 101 pd txt_qst_dynamic_likert;
#N canvas 855 318 343 430 txt_qst_dynamic_canvastext 0;
#X obj -95 28 l2s;
#X obj -95 -31 r \$0-q_fontsize;
#X obj -95 -2 r \$0-txt_qst_dc_text;
#X msg -95 -61 12;
#X obj -95 -91 r \$0-txt_qst_engine_reset;
#X obj -95 -121 r \$0-txt_qst_sndrcv_num;
#X obj -95 -151 r \$0-txt_qst_vpos;
#X obj -95 -181 r \$0-txt_qst_hpos;
#X obj -236 69 pack f f f f f s;
#X obj -236 -181 r \$0-txt_qst_dc_trig;
#X msg -236 99 obj \$2 \$3 cnv 0 0 0 scnv-\$4 rcnv-\$4 \$6 0 0 0 \$5
0 -1 0;
#X obj -209 189 s pd-\$0-txt_qst_screen;
#X obj -236 129 t a a;
#X obj -209 159 s \$0-txt_qst_cel_count;
#X connect 0 0 8 5;
#X connect 1 0 8 4;
#X connect 2 0 0 0;
#X connect 3 0 8 4;
#X connect 4 0 3 0;
#X connect 5 0 8 3;
#X connect 6 0 8 2;
#X connect 7 0 8 1;
#X connect 8 0 10 0;
#X connect 9 0 8 0;
#X connect 10 0 12 0;
#X connect 12 0 11 0;
#X connect 12 1 13 0;
#X restore -92 71 pd txt_qst_dynamic_canvastext;
#N canvas 795 24 246 400 txt_qst_loader 0;
#X msg -10 54 read \$1;
#N canvas 420 618 364 195 add_path_n_filename 0;
#X obj 250 -28 inlet;
#X obj 232 122 outlet;
#X obj 7 -28 r \$0-prg_path;
#X msg 7 32 symbol /Users/juigmend/Desktop/Experiment 3/Experiment_3_Data_Recording
;
```

```
#X msg 7 2 set symbol \$1;
#X obj 232 62 pack s s;
#X obj 277 32 l2s;
#X obj 232 92 makesymbol %s/%s;
#X obj 250 2 t a a;
#X obj 107 -28 r loadbang;
#X msg 107 2 set;
#X connect 0 0 8 0;
#X connect 2 0 4 0;
#X connect 3 0 5 0;
#X connect 4 0 3 0;
#X connect 5 0 7 0;
#X connect 6 0 5 1;
#X connect 7 0 1 0;
#X connect 8 0 3 0;
#X connect 8 1 6 0;
#X connect 9 0 10 0;
#X connect 10 0 3 0;
#X restore -10 24 pd add_path_n_filename;
#X msg 70 153 rewind;
#X obj 70 215 msgfile;
#X msg -10 245 0;
#X msg 0 155 0;
#X obj -10 305 s \$0-txtqstloader_reset;
#N canvas 920 481 230 196 reader 0;
#X obj 7 35 l2s;
#X msg 7 65 set \$1;
#X msg 7 125 q_contaspace;
#X obj 7 175 outlet;
#X obj 137 95 bng 15 250 50 0 empty empty empty 17 7 0 10 -262144 -1
-1;
#X obj 7 95 t b a;
#X obj 137 5 inlet else;
#X obj 7 5 inlet from_msgfile;
#X connect 0 0 1 0;
#X connect 1 0 5 0;
#X connect 2 0 3 0;
#X connect 4 0 2 0;
#X connect 5 0 2 0;
#X connect 5 1 2 0;
#X connect 6 0 4 0;
#X connect 7 0 0 0;
#X restore 70 245 pd reader;
#N canvas 618 22 622 737 txtqst_distributor 0;
#X obj 431 664 s \$0-q_instext;
#X obj 441 644 s \$0-q_likert;
#X obj 461 604 s \$0-q_nominal;
#X obj 511 504 s \$0-q_else;
#X obj 421 341 r \$0-txtqstloader_reset;
#X msg 1 341 1;
#X msg 42 341 2;
#X obj 1 123 list trim;
#X obj 400 64 gate 2;
#X obj 400 4 inlet gate number;
#X obj 291 4 inlet input data;
#X msg 353 124 1;
#X obj 180 4 r \$0-txtqst_gate;
#X obj 353 154 s \$0-txtqst_gate;
#X obj 433 94 t a a;
#X obj 421 704 s \$0-q_fontsize;
#X obj 421 684 fromsymbol;
#X obj 451 624 s \$0-q_inputext;
#X obj 481 564 s \$0-q_img;
#X obj 492 544 s \$0-q_linefreeze;
#X obj 471 584 s \$0-q_flushbutton;
#X obj 340 304 s \$0-q_emptyline;
#X obj 340 214 s \$0-q_else;
#X obj 340 274 s \$0-q_stop;
#X obj 421 455 gate 10;
#X obj 502 524 s \$0-q_contbutton;
#X msg 209 341 6;
#X msg 84 341 3;
#X msg 125 341 4;
#X msg 167 341 5;
#X msg 249 341 7;
#X msg 289 341 8;
#X msg 329 341 9;
#X obj 1 153 route q_fontsize q_instext q_likert q_inputext q_nominal
q_flushbutton q_img q_linefreeze q_contbutton q_emptyline q_end q_contaspace
;
#X obj 340 244 s \$0-q_contaspace;
#X connect 4 0 24 0;
#X connect 5 0 24 0;
#X connect 6 0 24 0;
#X connect 7 0 33 0;
#X connect 8 0 7 0;
#X connect 8 1 14 0;
#X connect 9 0 8 0;
#X connect 10 0 8 1;
#X connect 11 0 13 0;
#X connect 12 0 8 0;
#X connect 14 0 11 0;
#X connect 14 1 24 1;
#X connect 16 0 15 0;
#X connect 24 0 16 0;
#X connect 24 1 0 0;
#X connect 24 2 1 0;
#X connect 24 3 17 0;
#X connect 24 4 2 0;
#X connect 24 5 20 0;
#X connect 24 6 18 0;
#X connect 24 7 19 0;
#X connect 24 8 25 0;
#X connect 24 9 3 0;
#X connect 26 0 24 0;
#X connect 27 0 24 0;
#X connect 28 0 24 0;
#X connect 29 0 24 0;
#X connect 30 0 24 0;
#X connect 31 0 24 0;
#X connect 32 0 24 0;
#X connect 33 0 5 0;
#X connect 33 1 6 0;
#X connect 33 2 27 0;
#X connect 33 3 28 0;
#X connect 33 4 29 0;
#X connect 33 5 26 0;
#X connect 33 6 30 0;
#X connect 33 7 31 0;
```

```
#X connect 33 8 32 0;
#X connect 33 9 21 0;
#X connect 33 10 23 0;
#X connect 33 11 34 0;
#X connect 33 12 22 0;
#X restore 70 275 pd txtqst_distributor;
#X msg 193 245 1;
#X obj 121 185 r \$0-q_else;
#X msg 148 245 2;
#X obj 121 215 t b b;
#X obj 154 95 t a a a;
#X obj 30 115 r \$0-q_cont;
#X msg 30 155 1;
#X obj 0 85 r \$0-q_stop;
#X obj 17 -6 s \$0-new_txtqst;
#X obj 193 155 bang;
#X obj -10 -66 inlet file name;
#X obj -10 -36 t a b;
#X obj 0 185 metro 2;
#X connect 0 0 4 0;
#X connect 0 0 13 0;
#X connect 1 0 0 0;
#X connect 2 0 3 0;
#X connect 3 0 7 0;
#X connect 4 0 6 0;
#X connect 5 0 21 0;
#X connect 7 0 8 0;
#X connect 9 0 8 1;
#X connect 10 0 12 0;
#X connect 11 0 8 1;
#X connect 12 0 7 1;
#X connect 12 1 11 0;
#X connect 13 0 15 0;
#X connect 13 1 2 0;
#X connect 13 2 3 0;
#X connect 13 2 18 0;
#X connect 14 0 15 0;
#X connect 15 0 21 0;
#X connect 16 0 5 0;
#X connect 18 0 9 0;
#X connect 19 0 20 0;
#X connect 20 0 1 0;
#X connect 20 1 17 0;
#X connect 21 0 3 0;
#X restore -92 -119 pd txt_qst_loader;
#N canvas 977 278 943 699 txt_qst_display_manager 0;
#X obj -211 -188 r \$0-q_instext;
#X obj -184 233 s \$0-txt_qst_dc_text;
#X obj -111 -188 r \$0-q_likert;
#X obj -211 -158 t b a;
#N canvas 796 148 361 519 txt_qst_positioner 0;
#X obj 82 37 r \$0-new_txtqst;
#X obj 82 97 cup;
#X msg 82 67 0;
#X obj -101 307 +;
#X obj -129 127 t b b;
#X obj -86 247 *;
#X msg -86 177 32;
#X msg -148 337 20;
#X msg -129 177 50;
#X obj -86 277 +;
#X obj -53 127 r \$0-q_emptyline;
#X obj 64 257 +;
#X msg 64 187 0;
#X msg -53 177 32;
#X obj 104 257 f;
#X obj 64 217 t f f;
#X obj -86 67 * 2;
#X obj -86 7 r \$0-q_fontsize;
#X msg -86 97 set \$1;
#X obj -86 37 fromsymbol;
#X obj -148 -33 t b b b;
#X obj -101 337 s \$0-txt_qst_vpos;
#X obj -121 397 s \$0-txt_qst_hpos;
#X obj -148 367 t b a;
#X obj -148 -63 r \$0-txt_qst_positioner;
#X obj 82 127 s \$0-txt_qst_ln_num;
#X obj -148 423 s \$0-txt_qst_general_trig;
#X obj 17 337 s \$0-q_next;
#X obj 64 157 r \$0-new_txtqst;
#X obj 55 -23 r \$0-txt_qst_linefreeze;
#X obj 22 7 spigot;
#X connect 0 0 2 0;
#X connect 1 0 5 1;
#X connect 1 0 25 0;
#X connect 2 0 1 0;
#X connect 3 0 21 0;
#X connect 4 0 8 0;
#X connect 4 1 6 0;
#X connect 5 0 9 0;
#X connect 6 0 5 0;
#X connect 7 0 23 0;
#X connect 8 0 3 0;
#X connect 9 0 3 1;
#X connect 10 0 13 0;
#X connect 11 0 14 0;
#X connect 11 0 9 1;
#X connect 12 0 15 0;
#X connect 13 0 11 0;
#X connect 13 0 27 0;
#X connect 14 0 11 1;
#X connect 15 0 11 0;
#X connect 15 1 11 1;
#X connect 16 0 18 0;
#X connect 17 0 19 0;
#X connect 18 0 6 0;
#X connect 18 0 13 0;
#X connect 19 0 16 0;
#X connect 20 0 7 0;
#X connect 20 1 4 0;
#X connect 20 2 30 0;
#X connect 23 0 26 0;
#X connect 23 1 22 0;
#X connect 24 0 20 0;
#X connect 28 0 12 0;
#X connect 29 0 30 1;
#X connect 30 0 1 0;
#X restore -201 433 pd txt_qst_positioner;
#X obj -48 233 r \$0-q_instext;
```

```
#X obj 62 173 r \$0-q_likert;
#X msg -48 263 1;
#X msg 62 203 2;
#X msg 152 143 3;
#X msg 262 83 4;
#X obj 506 483 s \$0-txt_qst_dc_trig;
#X obj -111 -158 t b a;
#X obj -211 263 s \$0-txt_qst_positioner;
#X obj -111 203 s \$0-txt_qst_positioner;
#X obj 514 462 s \$0-txt_qst_dl_trig;
#X obj -84 173 s \$0-txt_qst_dl_param;
#X obj -17 -188 r \$0-q_inputext;
#X obj -17 -158 t b a;
#X obj -17 143 s \$0-txt_qst_positioner;
#X obj 539 272 r \$0-txt_qst_general_trig;
#X obj 10 113 s \$0-txt_qst_de_param;
#X obj 522 442 s \$0-txt_qst_de_trig;
#X obj 10 83 fromsymbol;
#X obj 152 113 r \$0-q_inputext;
#X obj 89 -158 t b a;
#X obj 89 83 s \$0-txt_qst_positioner;
#X obj 116 53 s \$0-txt_qst_dn_param;
#X obj 89 -188 r \$0-q_nominal;
#X obj 262 53 r \$0-q_nominal;
#X obj 530 422 s \$0-txt_qst_dn_trig;
#X obj 189 -158 t b a;
#X obj 189 23 s \$0-txt_qst_positioner;
#X msg 393 22 5;
#X obj 312 -158 t b a;
#X obj 312 -37 s \$0-txt_qst_positioner;
#X obj 312 -188 r \$0-q_img;
#X obj 339 -68 s \$0-txt_qst_img_param;
#X obj 506 -68 r \$0-q_img;
#X msg 506 -38 6;
#X obj 549 382 s \$0-txt_qst_img_trig;
#X obj 189 -188 r \$0-q_flushbutton;
#X obj 216 -8 s \$0-txt_qst_flushbtn_param;
#X obj 393 -8 r \$0-q_flushbutton;
#X obj 539 402 s \$0-txt_qst_flushbtn_trig;
#X obj 387 -158 t b a;
#X obj 387 -97 s \$0-txt_qst_positioner;
#X obj 387 -188 r \$0-q_contbutton;
#X obj 414 -128 s \$0-txt_qst_contbtn_param;
#X obj 585 -128 r \$0-q_contbutton;
#X msg 585 -98 7;
#X obj 506 302 gate 7;
#X obj 559 362 s \$0-txt_qst_contbtn_trig;
#X connect 0 0 3 0;
#X connect 2 0 12 0;
#X connect 3 0 13 0;
#X connect 3 1 1 0;
#X connect 5 0 7 0;
#X connect 6 0 8 0;
#X connect 7 0 51 0;
#X connect 8 0 51 0;
#X connect 9 0 51 0;
#X connect 10 0 51 0;
#X connect 12 0 14 0;
#X connect 12 1 16 0;
#X connect 17 0 18 0;
#X connect 18 0 19 0;
#X connect 18 1 23 0;
#X connect 20 0 51 1;
#X connect 23 0 21 0;
#X connect 24 0 9 0;
#X connect 25 0 26 0;
#X connect 25 1 27 0;
#X connect 28 0 25 0;
#X connect 29 0 10 0;
#X connect 31 0 32 0;
#X connect 31 1 42 0;
#X connect 33 0 51 0;
#X connect 34 0 35 0;
#X connect 34 1 37 0;
#X connect 36 0 34 0;
#X connect 38 0 39 0;
#X connect 39 0 51 0;
#X connect 41 0 31 0;
#X connect 43 0 33 0;
#X connect 45 0 46 0;
#X connect 45 1 48 0;
#X connect 47 0 45 0;
#X connect 49 0 50 0;
#X connect 50 0 51 0;
#X connect 51 0 11 0;
#X connect 51 1 15 0;
#X connect 51 2 22 0;
#X connect 51 3 30 0;
#X connect 51 4 44 0;
#X connect 51 5 40 0;
#X connect 51 6 52 0;
#X restore -92 -29 pd txt_qst_display_manager;
#N canvas 829 22 442 740 txt_qst_dynamic_entry 0;
#X obj -175 19 r \$0-q_fontsize;
#X obj -175 -101 r \$0-txt_qst_vpos;
#X obj -175 -131 r \$0-txt_qst_hpos;
#X obj -286 -71 cup;
#X obj -286 -131 r \$0-new_txtqst;
#X obj -336 -131 t b b;
#X msg -286 -101 1;
#X msg -175 430 connect \$1 0 \$2 0;
#X msg -175 399 connect \$1 0 \$2 0;
#X obj -99 -42 s \$0-q_stop;
#X obj -236 550 s pd-\$0-txt_qst_screen;
#N canvas 829 300 414 247 de_c_index_proc 0;
#X text 91 -4 connect_index_processor;
#X obj 103 24 inlet bang_2;
#X obj 259 24 inlet bang_1;
#X obj 214 184 pack f f;
#X obj 259 94 f;
#X obj 103 184 pack f f;
#X obj 103 94 f;
#X obj 103 214 outlet connect_B;
#X obj 214 214 outlet connect_A;
#X obj -8 184 pack f f;
#X obj -8 94 f;
#X obj 37 154 - 1;
#X obj -8 24 inlet bang_3;
#X obj 148 154 - 2;
```

```
#X obj 214 154 - 3;
#X obj -8 214 outlet connect_C;
#X obj -8 124 t f f;
#X obj 103 124 t f f;
#X obj 259 124 t f f;
#X obj 274 54 r \$0-txt_qst_cel_num;
#X connect 1 0 6 0;
#X connect 2 0 4 0;
#X connect 3 0 8 0;
#X connect 4 0 18 0;
#X connect 5 0 7 0;
#X connect 6 0 17 0;
#X connect 9 0 15 0;
#X connect 10 0 16 0;
#X connect 11 0 9 1;
#X connect 12 0 10 0;
#X connect 13 0 5 1;
#X connect 14 0 3 0;
#X connect 16 0 9 0;
#X connect 16 1 11 0;
#X connect 17 0 5 0;
#X connect 17 1 13 0;
#X connect 18 0 14 0;
#X connect 18 1 3 1;
#X connect 19 0 4 1;
#X connect 19 0 6 1;
#X connect 19 0 10 1;
#X restore -322 339 pd de_c_index_proc;
#X obj -241 -71 + 40;
#X msg -175 349 obj \$2 \$3 entry \$5 \$7 white black;
#X msg -336 470 \; e_\$4 fontsize \$6;
#X msg -175 289 obj \$2 \$3 s e_\$4b;
#X msg -175 460 connect \$1 1 \$2 0;
#X obj -336 -162 r \$0-txt_qst_de_trig;
#X obj -175 -71 r \$0-txt_qst_de_param;
#X obj -130 49 + 10;
#X obj -175 49 * 1.3;
#X obj -175 -11 expr ($f1*10)+40;
#X obj -336 129 pack f f f f f f f f;
#X obj -175 99 r \$0-txt_qst_de_param;
#X msg -175 219 obj \$2 \$3 r e_\$4;
#X msg -175 249 obj \$2 \$3 s e_\$4a;
#X obj -54 249 s \$0-txt_qst_cel_count;
#X obj -54 279 s \$0-txt_qst_cel_count;
#X obj -54 319 s \$0-txt_qst_cel_count;
#X obj -54 379 s \$0-txt_qst_cel_count;
#N canvas 829 22 402 694 de_capture 0;
#N canvas 1347 22 313 258 de_reader 0;
#X obj 210 5 s de_cap_a;
#X obj 210 30 s de_cap_b;
#X restore -25 89 pd de_reader;
#X obj -176 519 s pd-de_reader;
#X obj -176 -151 inlet de_list;
#X obj -176 -31 * 30;
#X obj 10 -1 s pd-de_reader;
#X msg -89 -31 symbol $;
#X obj -89 -1 makesymbol %s1;
#X msg -25 339 connect \$1 0 \$2 0;
#N canvas 542 412 377 249 de_connector 0;
#X obj 105 203 outlet 3rd;
#X obj 181 203 outlet 2nd;
#X obj 256 203 outlet 1st;
#X obj 33 -7 inlet;
#X msg 33 23 \$2;
#X obj 181 173 pack f f;
#X obj 30 173 pack f f;
#X obj 30 203 outlet 4th;
#X obj 33 53 * 6;
#X obj -45 173 pack f f;
#X obj -45 203 outlet 5th;
#X obj 256 143 - 3;
#X obj 181 143 - 2;
#X obj 226 143 - 1;
#X obj 105 143 - 1;
#X obj 30 143 - 1;
#X obj 33 83 t f f f f f f f f;
#X obj 0 143 + 1;
#X connect 3 0 4 0;
#X connect 4 0 8 0;
#X connect 5 0 1 0;
#X connect 6 0 7 0;
#X connect 8 0 16 0;
#X connect 9 0 10 0;
#X connect 11 0 2 0;
#X connect 12 0 5 0;
#X connect 13 0 5 1;
#X connect 14 0 0 0;
#X connect 15 0 6 0;
#X connect 16 0 9 0;
#X connect 16 1 17 0;
#X connect 16 2 15 0;
#X connect 16 3 6 1;
#X connect 16 4 14 0;
#X connect 16 5 12 0;
#X connect 16 6 13 0;
#X connect 16 7 11 0;
#X connect 17 0 9 1;
#X restore -176 199 pd de_connector;
#X obj -25 519 s \$0-q_cont;
#X obj -25 459 bang;
#X obj -25 489 delay 1;
#X obj -36 -151 r \$0-new_txtqst;
#X msg 57 -91 clear;
#X msg -176 -121 \$4 \$8;
#X obj -176 -91 trigger l l l b;
#X msg -176 -61 \$1;
#X msg -147 -61 \$1;
#X msg -118 -61 \$2;
#N canvas 875 22 625 814 de_max_char 0;
#X restore -25 59 pd de_max_char;
#X obj -36 -121 t bang bang bang;
#X obj -176 -1 + 30;
#X msg -25 309 connect \$1 0 0 0;
#X msg -25 369 connect \$1 0 1 0;
#X msg -25 159 obj 35 \$1 r e_\$2a;
#X msg -25 189 obj 90 \$1 r e_\$2b;
#X msg -25 129 floatatom 5 \$1 4 - - - - r_e_m_\$2 s_e_m;
#N canvas 773 620 420 368 de_fetcher 0;
#X restore 75 59 pd de_fetcher;
```

```
#X obj -25 29 r \$0-txt_qst_del_num;
#X obj -176 59 pack f f f s f;
#X msg -25 219 msg 140 \$1 \$2 \$4 \$3 \$5;
#X msg 56 -61 obj 210 5 s de_cap_a;
#X msg 56 -31 obj 210 30 s de_cap_b;
#X msg -25 399 connect \$1 0 \$2 0;
#X msg -25 429 connect \$1 0 \$2 0;
#X obj -176 89 t l l l l l l l l;
#X msg -25 249 obj 210 \$1 bang;
#X msg -25 279 obj 245 \$1 s e_\$2;
#X connect 2 0 14 0;
#X connect 3 0 21 0;
#X connect 5 0 6 0;
#X connect 6 0 29 3;
#X connect 7 0 1 0;
#X connect 8 0 34 0;
#X connect 8 1 33 0;
#X connect 8 2 23 0;
#X connect 8 3 7 0;
#X connect 8 4 22 0;
#X connect 10 0 11 0;
#X connect 11 0 9 0;
#X connect 12 0 20 0;
#X connect 13 0 4 0;
#X connect 14 0 15 0;
#X connect 15 0 16 0;
#X connect 15 1 17 0;
#X connect 15 2 18 0;
#X connect 15 3 5 0;
#X connect 16 0 3 0;
#X connect 17 0 29 1;
#X connect 18 0 29 2;
#X connect 20 0 32 0;
#X connect 20 1 31 0;
#X connect 20 2 13 0;
#X connect 21 0 29 0;
#X connect 22 0 1 0;
#X connect 23 0 1 0;
#X connect 24 0 1 0;
#X connect 25 0 1 0;
#X connect 26 0 1 0;
#X connect 28 0 29 4;
#X connect 29 0 35 0;
#X connect 30 0 1 0;
#X connect 31 0 4 0;
#X connect 32 0 4 0;
#X connect 33 0 1 0;
#X connect 34 0 1 0;
#X connect 34 0 10 0;
#X connect 35 0 8 0;
#X connect 35 1 37 0;
#X connect 35 2 36 0;
#X connect 35 3 30 0;
#X connect 35 4 25 0;
#X connect 35 5 24 0;
#X connect 35 6 26 0;
#X connect 36 0 1 0;
#X connect 37 0 1 0;
#X restore -54 550 pd de_capture;
#X obj -336 159 t l b b b l l l l l;
#X obj -175 189 s \$0-de_cap_list;
#X obj -33 490 r \$0-de_cap_list;
#X obj -54 520 list;
#X obj -175 490 bang;
#X connect 0 0 19 0;
#X connect 0 0 20 0;
#X connect 1 0 22 2;
#X connect 2 0 12 0;
#X connect 3 0 22 3;
#X connect 4 0 6 0;
#X connect 5 0 22 0;
#X connect 5 1 3 0;
#X connect 6 0 3 0;
#X connect 7 0 10 0;
#X connect 8 0 10 0;
#X connect 11 0 16 0;
#X connect 11 1 7 0;
#X connect 11 2 8 0;
#X connect 12 0 22 1;
#X connect 13 0 10 0;
#X connect 13 0 29 0;
#X connect 15 0 10 0;
#X connect 15 0 28 0;
#X connect 16 0 10 0;
#X connect 16 0 35 0;
#X connect 17 0 5 0;
#X connect 18 0 9 0;
#X connect 18 0 21 0;
#X connect 19 0 22 6;
#X connect 20 0 22 5;
#X connect 21 0 22 4;
#X connect 22 0 31 0;
#X connect 23 0 22 7;
#X connect 24 0 10 0;
#X connect 24 0 26 0;
#X connect 25 0 10 0;
#X connect 25 0 27 0;
#X connect 31 0 14 0;
#X connect 31 1 11 0;
#X connect 31 2 11 1;
#X connect 31 3 11 2;
#X connect 31 4 13 0;
#X connect 31 5 15 0;
#X connect 31 6 25 0;
#X connect 31 7 24 0;
#X connect 31 8 32 0;
#X connect 33 0 34 1;
#X connect 34 0 30 0;
#X connect 35 0 34 0;
#X restore -92 131 pd txt_qst_dynamic_entry;
#N canvas 779 22 256 420 txt_qst_dynamic_nominal 0;
#X obj -110 -1 +;
#X obj -95 -21 r \$0-txt_qst_hpos;
#X obj -78 39 r \$0-q_fontsize;
#X obj -94 19 r \$0-txt_qst_vpos;
#X obj 0 139 r \$0-q_fontsize;
#X text 9 119 label-y;
#X symbolatom 26 -120 8 0 0 0 - dn-select_disp foooooo;
#X text -91 -120 Nominal selection:;
```

```
#N canvas 1506 584 171 155 dn_makenum 0;
#X obj -66 5 inlet;
#X obj 41 24 loadbang;
#X obj -66 95 cup;
#X msg -25 65 1;
#X obj -25 5 r \$0-new_txtqst;
#X obj -66 65 bang;
#X obj -66 125 s \$0-dn_num;
#X connect 0 0 5 0;
#X connect 1 0 3 0;
#X connect 2 0 6 0;
#X connect 3 0 2 0;
#X connect 4 0 3 0;
#X connect 5 0 2 0;
#X restore -94 -91 pd dn_makenum;
#X obj -63 59 r \$0-dn_num;
#X obj 16 159 r \$0-dn-label;
#X obj -110 -41 r \$0-dn_offset;
#X obj -125 -61 r \$0-dn_makeone;
#N canvas 778 467 837 453 nominal_device 0;
#X msg -5 58 0;
#X msg 36 58 1;
#X obj 323 -32 inlet parameters_for_one_tgl;
#X obj 105 28 t bang bang bang;
#X obj 151 268 ==;
#X obj 151 304 select 1;
#X obj 151 178 cup;
#X msg 204 58 clear;
#X obj 259 304 delay 1;
#X obj -5 88 metro 2;
#X obj 224 28 loadbang;
#X obj 320 334 s \$0-dn_offset;
#X obj 269 364 s \$0-dn_makeone;
#X obj 151 334 s \$0-dn-done;
#X obj 188 118 r \$0-dn-label;
#X obj 204 88 s \$0-dn-clear;
#X obj -79 334 s \$0-dn-label;
#X obj -5 28 r \$0-dn-done;
#X obj 45 208 s dn-select_disp;
#X msg 170 238 2;
#X obj -103 -32 inlet parameters;
#X obj -136 287 symbol;
#X obj -79 287 symbol;
#X obj -5 178 cup;
#X obj -5 238 select 1 2;
#X obj 188 148 bang;
#X msg 45 128 0;
#X msg 151 148 1;
#X obj 259 238 t b f;
#X obj 323 36 s pd-\$0-txt_qst_screen;
#X obj 70 334 s \$0-q_cont;
#X obj 135 -32 r \$0-txt_qst_dn_trig;
#X obj 135 -2 s \$0-q_stop;
#X obj 224 -2 r \$0-new_txtqst;
#X msg 323 -2 obj \$2 \$3 toggle \$4 1 sdn-\$5 rdn-\$5_\$6 \$10 \$7
\$8 0 \$9 10 -1 -1 0 \$6;
#X obj 338 96 r dn-select;
#N canvas 379 257 505 602 nominal_selection_displayer 0;
#X obj -222 353 ==;
#X obj -222 383 select 1;
#X obj -222 262 cup;
#X obj -222 293 t f f;
#X obj -61 370 pack f f;
#X obj -94 323 select;
#X msg -292 202 0;
#X obj -190 -37 spigot;
#X obj -100 172 t b b f;
#X msg -110 -68 1;
#X msg -157 -68 0;
#X obj -152 383 loadbang;
#X obj -249 -158 inlet button index;
#X msg -222 232 1;
#X obj -292 232 metro 10;
#X obj -100 142 f;
#X obj -188 52 delay 10;
#X obj 19 264 l2s;
#X obj -16 323 r \$0-selec_n_index;
#X msg -195 323 2;
#X obj -222 414 s \$0-dn-stopsetsel;
#X msg -61 400 \; rdn-\$2_\$1 0;
#X obj -80 -128 r \$0-dn-stopsetsel;
#X obj -292 172 r \$0-dn-stopsetsel;
#X obj -371 -158 inlet nominal index;
#X obj 19 294 s dn-select_disp;
#X obj -292 112 f;
#X obj -292 142 s \$0-selec_n_index;
#X obj -188 82 t b b;
#X obj -80 -98 r \$0-new_txtqst;
#X obj 23 32 - 1;
#X obj -133 -158 inlet data capture num;
#X obj -190 -108 pack f f f;
#X obj -190 -7 unpack float float f;
#X obj -5 82 pack f f f;
#X obj -5 112 unpack f f f;
#X obj -5 182 pack f f f f;
#X obj -5 152 t b f;
#X obj -5 212 unpack f f f f;
#X obj 19 242 pack f f f;
#X connect 0 0 1 0;
#X connect 1 0 20 0;
#X connect 2 0 3 0;
#X connect 3 0 0 0;
#X connect 3 1 5 0;
#X connect 3 1 19 0;
#X connect 4 0 21 0;
#X connect 5 1 4 0;
#X connect 6 0 14 0;
#X connect 7 0 10 0;
#X connect 7 0 33 0;
#X connect 8 0 14 0;
#X connect 8 1 13 0;
#X connect 8 2 5 1;
#X connect 9 0 7 1;
#X connect 10 0 7 1;
#X connect 11 0 20 0;
#X connect 12 0 32 1;
#X connect 13 0 2 0;
#X connect 14 0 2 0;
#X connect 15 0 8 0;
```

```
#X connect 16 0 28 0;
#X connect 17 0 25 0;
#X connect 18 0 4 1;
#X connect 19 0 0 1;
#X connect 22 0 9 0;
#X connect 23 0 6 0;
#X connect 23 0 13 0;
#X connect 24 0 32 0;
#X connect 26 0 27 0;
#X connect 28 0 15 0;
#X connect 28 1 26 0;
#X connect 29 0 9 0;
#X connect 30 0 34 1;
#X connect 31 0 32 2;
#X connect 32 0 7 0;
#X connect 33 0 26 1;
#X connect 33 0 34 0;
#X connect 33 1 16 0;
#X connect 33 1 15 1;
#X connect 33 1 30 0;
#X connect 33 2 34 2;
#X connect 34 0 35 0;
#X connect 35 0 37 0;
#X connect 35 1 36 3;
#X connect 35 2 36 1;
#X connect 36 0 38 0;
#X connect 37 0 36 0;
#X connect 37 1 36 2;
#X connect 38 1 39 0;
#X connect 38 2 39 1;
#X connect 38 3 39 2;
#X connect 39 0 17 0;
#X restore 323 186 pd nominal_selection_displayer;
#N canvas 1039 22 395 417 nominal_selection_machine 0;
#X obj 9 -95 r \$0-dn_num;
#X obj 44 24 * 30;
#X obj 83 -6 * 3;
#X msg 26 204 connect \$4 0 \$5 0;
#X msg 147 -6 symbol $;
#X obj 147 24 makesymbol %s1;
#X obj 9 -65 t b f f f b b;
#X msg 9 234 connect \$5 0 0 0;
#X obj 83 24 - 2;
#X obj 113 24 - 1;
#X obj 9 114 t l l l l;
#X obj 231 -6 s pd-dn_select_receiver;
#X obj 231 114 s pd-dn_select_receiver;
#X obj 231 174 s pd-dn_select_receiver;
#X obj 231 204 s pd-dn_select_receiver;
#X obj 231 234 s pd-dn_select_receiver;
#X obj 231 264 s pd-dn_select_receiver;
#N canvas 1450 22 200 420 dn_select_receiver 0;
#X coords 0 0 1 1 60 60 0;
#X restore 9 264 pd dn_select_receiver;
#X obj 231 84 r \$0-dn-clear;
#X msg 60 144 floatatom 10 \$3 2 0 0 0 - sdn-\$2;
#X obj 231 54 r \$0-txt_qst_del_num;
#X obj 9 84 pack f f f f f s f;
#X msg 43 174 msg 30 \$3 \$2 \$6 \$7;
#X msg 231 -36 obj 120 10 s dn-select;
#X connect 0 0 6 0;
#X connect 1 0 21 2;
#X connect 2 0 8 0;
#X connect 2 0 9 0;
#X connect 3 0 15 0;
#X connect 4 0 5 0;
#X connect 5 0 21 5;
#X connect 6 0 21 0;
#X connect 6 1 21 1;
#X connect 6 2 1 0;
#X connect 6 3 2 0;
#X connect 6 4 4 0;
#X connect 6 5 23 0;
#X connect 7 0 16 0;
#X connect 8 0 21 3;
#X connect 9 0 21 4;
#X connect 10 0 7 0;
#X connect 10 1 3 0;
#X connect 10 2 22 0;
#X connect 10 3 19 0;
#X connect 18 0 12 0;
#X connect 19 0 13 0;
#X connect 20 0 21 6;
#X connect 21 0 10 0;
#X connect 22 0 14 0;
#X connect 23 0 11 0;
#X restore 323 66 pd nominal_selection_machine;
#X obj 372 156 route 0;
#X obj 151 208 t f f f;
#X obj 320 238 s \$0-dn-value;
#X obj 320 268 select 1 2;
#X obj -103 58 unpack s s;
#X msg 320 304 40;
#X msg 348 304 200;
#X obj -103 -2 l2s;
#X obj -103 28 s2l;
#X obj 259 394 s \$0-txt_qst_cel_count;
#X obj 338 126 unpack f f f;
#X msg 45 178 symbol;
#X connect 0 0 9 0;
#X connect 1 0 9 0;
#X connect 2 0 34 0;
#X connect 3 0 1 0;
#X connect 3 1 27 0;
#X connect 3 2 26 0;
#X connect 4 0 5 0;
#X connect 5 0 13 0;
#X connect 5 0 30 0;
#X connect 6 0 39 0;
#X connect 7 0 15 0;
#X connect 7 0 49 0;
#X connect 8 0 12 0;
#X connect 8 0 47 0;
#X connect 9 0 23 0;
#X connect 10 0 7 0;
#X connect 14 0 25 0;
#X connect 17 0 0 0;
#X connect 19 0 4 1;
#X connect 20 0 45 0;
```

```
#X connect 21 0 16 0;
#X connect 22 0 16 0;
#X connect 23 0 24 0;
#X connect 24 0 21 0;
#X connect 24 1 22 0;
#X connect 25 0 6 0;
#X connect 26 0 23 0;
#X connect 27 0 6 0;
#X connect 28 0 8 0;
#X connect 28 1 41 0;
#X connect 31 0 3 0;
#X connect 31 0 32 0;
#X connect 33 0 7 0;
#X connect 34 0 29 0;
#X connect 35 0 48 0;
#X connect 38 1 36 1;
#X connect 39 0 4 0;
#X connect 39 1 19 0;
#X connect 39 1 28 0;
#X connect 39 2 40 0;
#X connect 41 0 43 0;
#X connect 41 1 44 0;
#X connect 42 0 21 1;
#X connect 42 1 22 1;
#X connect 43 0 11 0;
#X connect 44 0 11 0;
#X connect 45 0 46 0;
#X connect 46 0 42 0;
#X connect 48 0 36 0;
#X connect 48 1 38 0;
#X connect 48 2 36 2;
#X connect 49 0 18 0;
#X restore -145 241 pd nominal_device;
#X msg -16 119 38;
#X obj -78 119 + 8;
#X obj -145 -151 r \$0-txt_qst_dn_param;
#X obj -125 211 pack f f f f f f f f f s;
#X obj -47 79 r \$0-dn-value;
#X text -6 99 label-x;
#X msg -31 99 0;
#X obj -145 -121 t a b b;
#X connect 0 0 17 1;
#X connect 1 0 0 1;
#X connect 2 0 15 0;
#X connect 3 0 17 2;
#X connect 4 0 17 8;
#X connect 9 0 17 4;
#X connect 10 0 17 9;
#X connect 11 0 0 0;
#X connect 12 0 17 0;
#X connect 14 0 17 7;
#X connect 15 0 17 3;
#X connect 16 0 21 0;
#X connect 17 0 13 1;
#X connect 18 0 17 5;
#X connect 20 0 17 6;
#X connect 20 0 14 0;
#X connect 21 0 13 0;
#X connect 21 1 20 0;
#X connect 21 2 8 0;
#X restore -92 161 pd txt_qst_dynamic_nominal;
#N canvas 800 291 190 395 txt_qst_elements_counters 0;
#X obj -44 -29 r \$0-new_txtqst;
#X msg -44 1 0;
#X obj -85 31 cup;
#X msg -85 -29 bang;
#X text -84 -74 connectable elements counter;
#X text -84 106 data capture elements counter;
#X obj -85 61 s \$0-txt_qst_cel_num;
#X obj -85 -49 r \$0-txt_qst_cel_count;
#X obj -85 250 cup;
#X obj -85 131 r \$0-new_txtqst;
#X text -87 87 ------------------------------;
#X obj -85 280 s \$0-txt_qst_del_num;
#X obj -65 151 r \$0-q_likert;
#X obj -55 171 r \$0-q_inputext;
#X obj -45 190 r \$0-q_nominal;
#X obj -55 220 bang;
#X msg -85 220 1;
#X connect 0 0 1 0;
#X connect 1 0 2 0;
#X connect 2 0 6 0;
#X connect 3 0 2 0;
#X connect 7 0 3 0;
#X connect 8 0 11 0;
#X connect 9 0 16 0;
#X connect 12 0 15 0;
#X connect 13 0 15 0;
#X connect 14 0 15 0;
#X connect 15 0 8 0;
#X connect 16 0 8 0;
#X restore -92 1 pd txt_qst_elements_counters;
#N canvas 788 22 216 375 txt_qst_dynamic_image 0;
#X obj -35 -51 r \$0-txt_qst_vpos;
#X obj -43 -81 r \$0-txt_qst_hpos;
#X obj -54 133 s pd-\$0-txt_qst_screen;
#X obj -81 73 t a a;
#X obj -54 103 s \$0-txt_qst_cel_count;
#X obj -58 -21 +;
#X obj -81 -201 r \$0-txt_qst_img_trig;
#X obj -58 -171 r \$0-txt_qst_img_param;
#X obj -58 -141 fromsymbol;
#N canvas 420 618 348 229 add_path_n_filename 0;
#X obj 250 12 inlet;
#X obj 232 162 outlet;
#X obj 7 12 r \$0-prg_path;
#X msg 7 72 symbol /Users/juigmend/Desktop/Experiment 3/Experiment_3_Data_Recording
;
#X msg 7 42 set symbol \$1;
#X obj 232 102 pack s s;
#X obj 277 72 l2s;
#X obj 232 132 makesymbol %s/%s;
#X obj 250 42 t a a;
#X obj 107 12 r loadbang;
#X msg 107 42 set;
#X obj 7 -18 inlet foo;
#X connect 0 0 8 0;
#X connect 2 0 4 0;
#X connect 3 0 5 0;
```

```
#X connect 4 0 3 0;
#X connect 5 0 7 0;
#X connect 6 0 5 1;
#X connect 7 0 1 0;
#X connect 8 0 3 0;
#X connect 8 1 6 0;
#X connect 9 0 10 0;
#X connect 10 0 3 0;
#X restore -12 -21 pd add_path_n_filename;
#X obj -81 9 pack f f f s;
#X msg -81 43 obj \$2 \$3 image \$4;
#X obj -58 -111 unpack float symbol;
#X connect 0 0 10 2;
#X connect 1 0 5 1;
#X connect 3 0 2 0;
#X connect 3 1 4 0;
#X connect 5 0 10 1;
#X connect 6 0 10 0;
#X connect 7 0 8 0;
#X connect 8 0 12 0;
#X connect 9 0 10 3;
#X connect 10 0 11 0;
#X connect 11 0 3 0;
#X connect 12 0 5 0;
#X connect 12 1 9 1;
#X restore -92 221 pd txt_qst_dynamic_image;
#X text -95 30 --------------------------------;
#X text -91 42 TXT_QST ELEMENTS:;
#N canvas 0 22 224 185 txt_qst_init 0;
#X obj -65 -73 r \$0-txt_qst;
#X obj -95 -43 l2s;
#X obj -95 77 outlet to txt_qst_loader;
#X obj -65 47 s \$0-openclose_txt_qst_screen;
#X msg -65 17 1;
#X msg -27 -13 clear;
#X obj -27 17 s pd-\$0-txt_qst_screen;
#X obj -65 -43 t b b;
#X connect 0 0 1 0;
#X connect 0 0 7 0;
#X connect 1 0 2 0;
#X connect 4 0 3 0;
#X connect 5 0 6 0;
#X connect 7 0 4 0;
#X connect 7 1 5 0;
#X restore -92 -149 pd txt_qst_init;
#N canvas 911 22 152 194 txt_qst_linefreeze 0;
#X obj -47 -43 r \$0-q_linefreeze;
#X obj -47 -13 route on off;
#X msg -47 77 0;
#X msg -13 77 1;
#X obj -47 107 s \$0-txt_qst_linefreeze;
#X obj 37 47 r \$0-clrp;
#X obj 13 17 r \$0-setready;
#X connect 0 0 1 0;
#X connect 1 0 2 0;
#X connect 1 1 3 0;
#X connect 2 0 4 0;
#X connect 3 0 4 0;
#X connect 5 0 3 0;
#X connect 6 0 3 0;
#X restore -92 251 pd txt_qst_linefreeze;
#N canvas 766 488 369 478 txt_qst_flushbutton 0;
#X obj -154 -116 r \$0-txt_qst_hpos;
#X obj -120 -56 r \$0-q_fontsize;
#X obj -137 -86 r \$0-txt_qst_vpos;
#X obj -70 34 r \$0-q_fontsize;
#X text -62 4 label-y;
#X msg -87 4 38;
#X obj -120 34 + 8;
#X text -79 -27 label-x;
#X msg -104 -26 0;
#X obj -170 224 s pd-\$0-txt_qst_screen;
#X obj -170 124 pack f f f f f f f s;
#X text -173 259 bang creation arguments:;
#X msg -170 284 obj hpos vpos bng size int hold unknown snd rcv label
xlabel ylabel font labelsize bgcol btncol lblcol;
#X obj -53 94 l2s;
#X obj -160 194 s \$0-txt_qst_cel_count;
#X obj -154 34 * 3;
#X obj -170 -146 r \$0-txt_qst_flushbtn_trig;
#X obj -53 64 r \$0-txt_qst_flushbtn_param;
#X msg -170 154 obj \$2 \$3 bng \$4 100 250 0 snd-flushbtn rcvfoo \$8
\$5 \$6 0 \$7 1 46 -3;
#X connect 0 0 15 0;
#X connect 1 0 6 0;
#X connect 1 0 8 0;
#X connect 2 0 10 2;
#X connect 3 0 10 6;
#X connect 5 0 10 5;
#X connect 6 0 10 3;
#X connect 8 0 5 0;
#X connect 8 0 10 4;
#X connect 10 0 18 0;
#X connect 13 0 10 7;
#X connect 15 0 10 1;
#X connect 16 0 10 0;
#X connect 17 0 13 0;
#X connect 18 0 9 0;
#X connect 18 0 14 0;
#X restore -92 191 pd txt_qst_flushbutton;
#N canvas 791 22 374 505 txt_qst_contbutton 0;
#X obj -154 -116 r \$0-txt_qst_hpos;
#X obj -120 -31 r \$0-q_fontsize;
#X obj -137 -56 r \$0-txt_qst_vpos;
#X obj -70 59 r \$0-q_fontsize;
#X text -62 29 label-y;
#X msg -87 29 38;
#X obj -120 59 + 8;
#X text -79 -2 label-x;
#X msg -104 -1 0;
#X obj -170 249 s pd-\$0-txt_qst_screen;
#X obj -170 149 pack f f f f f f f s;
#X text -173 284 bang creation arguments:;
#X msg -170 309 obj hpos vpos bng size int hold unknown snd rcv label
xlabel ylabel font labelsize bgcol btncol lblcol;
#X obj -160 219 s \$0-txt_qst_cel_count;
#X obj -154 -86 * 3;
#X obj -170 -146 r \$0-txt_qst_contbtn_trig;
#X obj -53 89 r \$0-txt_qst_contbtn_param;
```

```
#X msg -170 179 obj \$2 \$3 bng \$4 100 250 0 snd-contbtn rcvfoo \$8
\$5 \$6 0 \$7 1 47 -3;
#X obj -53 119 symbol;
#X connect 0 0 14 0;
#X connect 1 0 6 0;
#X connect 1 0 8 0;
#X connect 2 0 10 2;
#X connect 3 0 10 6;
#X connect 5 0 10 5;
#X connect 6 0 10 3;
#X connect 8 0 5 0;
#X connect 8 0 10 4;
#X connect 10 0 17 0;
#X connect 14 0 10 1;
#X connect 15 0 10 0;
#X connect 16 0 18 0;
#X connect 17 0 9 0;
#X connect 17 0 13 0;
#X connect 18 0 10 7;
#X restore -92 281 pd txt_qst_contbutton;
#X connect 18 0 10 0;
#X restore 359 776 pd txt_qst;
#X text 49 854 Copyright 2013-2014 Juan Ignacio Mendoza;
#X obj 158 583 cnv 15 28 28 empty empty empty 20 12 0 14 -191407 -66577
0;
#X obj 160 585 cnv 18 24 24 empty empty empty 14 12 0 10 -1 -261682
0;
#X obj 164 589 bng 16 100 50 0 empty \$0-A/space empty 3 12 0 6 -1
-257985 -1;
#X text 147 70 v 0.1.3;
#X connect 3 0 29 2;
#X connect 4 0 29 1;
#X connect 5 0 24 0;
#X connect 20 0 29 0;
#X connect 25 0 20 0;
#X connect 25 0 4 0;
#X connect 25 0 3 0;
#X connect 25 0 5 0;
#X connect 28 0 31 0;
#X connect 30 0 5 0;
#X connect 31 0 20 0;
#X connect 31 0 4 0;
#X connect 31 0 3 0;
#X coords 0 0 1 1 342 902 1 0 0;
#X restore -251 -243 pd engines;
```

B VISUAURAL DOCUMENTATION

```
Visuaural v0.1.3 Alpha


Tested on:
- Puredata Extended 0.42.5
- Macintosh OS 10.8.5 and 10.7.5


February 20, 2014


===================================================================


Visuaural is an easy-to-use software to perform several procedures that allow empirical
research in music psychology and related fields.  It runs on Puredata Extended.


Once opened, the steps displayed in the user interface should be followed.


Visuaural will perform a procedure as stated in a "program", which should be written in
a plain text file.  The commands and usage to build a Visuaural program are given hereinbelow.


Visuaural is a by-product of my master's thesis for the Music, Mind and Technology master's
degree programme at the University of Jyväskylä in Finland.


Visuaural is copyrighted, free to use and free to distribute under the GNU license version
3.


----------------------------------
Program Format
-------



1 [first command] [parameter];

2 [second command] [parameter];

3 [third command] [parameter];

.
.
.
N [ending command] [parameter];
```

```
---------------------------------
Program Commands
--------


prog_ready [name];

Sets the program to be ready to start.
Displays name, date and participant number.


a_repinst [audiofilename.wav];

Plays back a wav audio file.
Waits 5 seconds for wiimote button A or space bar to playback the file again.


a_inst_nxt [audiofilename.wav];

Plays back a wav audio file.
Waits wiimote button A or space bar to advance to next step.


a_simpleplay [audiofilename.wav];

Plays back a wav audio file.
Waits 3 seconds to advance to next step.


a_randomplay [list.txt];

Plays back a wav audio file randomly chosen from a list containing audio files names (with
extensions).  The same list can be used several times and a_randomplay will play the files
in the list without repeating unless all the files have been played.  If another list is
used in between, then the shuffle property will be reset (i.e.  a file previously played
might be played again)
After each play it will output a .rpl text file containing the name of the audio file played.
Waits 3 seconds to advance to next step.


a_restartopt [audiofilename.wav];

Plays back a wav audio file.
Waits 5 seconds for wiimote button A or space bar to restart the program.


a_datacap_rt_nom [audiofilename.wav];

Plays back a wav audio file.
Records nominal response (100 or 0, wiimote button A or space bar) as the audio file plays.
Waits 3 seconds to advance to next step.


a_datacap_rt_wii_y [audiofilename.wav];

Plays back a wav audio file.
Records continuous response (-100 to 100 at 10Hz, wiimote pitch) as the audio file plays.
Waits 3 seconds to advance to next step.


a_rec_qstn [audiofilename.wav];

Plays back a wav audio file.
Records audio to a .wav file.
Waits for wiimote button A or space bar to advance to next step.


a_datacap_qstn [audiofilename.wav];

Plays back a wav audio file.
Records one of the preset wiimote button or keyboard keys and advances to next step.
```

Outputs a plain text file with extension .qst.

v_disptxt [parameter];

Displays text on a black background full screen without mouse cursor.

Parameters:

on
Displays a black full screen.

off
Close the black full screen.

[textfilename.txt]
Will display the content of a v_disptxt formatted text file.

v_disptxt textfilename.txt format:
[font size];

[colour];

[text line 1];

[text line 2];

...
[text line N];

font size range: 1 - 100?
colours: r y g b p w

v_disptxt_count [parameter];

Displays a counter on a black background full screen without mouse cursor.

Parameters:

[textfilename.txt]
Will set the parameters of the counter.

v_disptxt_count textfilename.txt format:
[font size];

[colour];

[text];

[start number];

[end number];

init
Sets counter to start number. show

Displays the counter and adds one. First display will be start number.

font size and colours are the same as v_disptxt
Screen needs to be turned off with "v_disptxt off"

wait [seconds];

Waits a number of seconds and advances to next step.

v_datacap_stroop [textfilename.txt];

Performs a Stroop test randomizing words and colours.
Outputs a plain text file with extension .str containing a list wuith the following data cycles: numbers for displayed colour, displayed word, answered colour and response time in milliseconds.

v_datacap_stroop textfilename.txt format:
[font size];

[colours to use];

[word 1];

[word 2];

...
[word N];

font size range: 1 - 100?
colours to use: r y g b p w

v_txt_qst [textfilename.txt];

Displays a questionnaire that can have text, likert scales, nominal checkboxes and free text entries. It can also be used to display simple text.
Outputs a plain text file with extension .qst.

v_txt_qst textfilename.txt format:

q_fontsize;

[font size];

q_instetxt;

[text to display];

q_emptyline;

q_likert;

[lowest_number highest_number (displays a Likert scale)]

```
q_nominal;

[label_1 label_2];


q_inputext;

[size of the text input box];


q_img;

[horizontal_position image.gif (displays a .gif image)]


q_linefreeze;

[on or off, default is off]


q_contbutton;

[text to display (continues to next step)];


q_flushbutton;

[text to display (flushes questionnaire and continues only if all questions have been responded,
otherwise displays a warning message)];


q_contaspace;

(no parameter, enables wiimote button A and space bar to advance to next step, default is
disabled)


Note:  Likert output is natural numbers, independent of the displayed range.


prog_end [parameters];

Ends the current program.


parameters:
end:  ends program
restart:  Wait 5 seconds and restart program from stage 3
("input number of participant")
```

```
----------------------------------
Preset Keys
------

Notes:
- Preset keys are valid for a_datacap_qstn.
- v_txt_qst accepts all keys and numbers.
- v_datacap_stroop has preassigned keys for colours.
- wiimote A or space bar will record 1 or 0.
- Tested on Apple Macintosh operating system 10.8

code:  wii//keyboard1/keyboard2

(100,0):  A/spacebar
1:  -//1
2:  home//2
3:  +//3
4:  1//y/Y
5:  2//n/N
6:  a/A
7:  s/S
8:  d/D
9:  j/J
10:  k/K
11:  l/L

----------------------------------
Stroop Test Colours Codes and Keys
-----------------

code:  key = colour

1:  A = red
2:  S = yellow
3:  D = green
4:  J = blue
5:  K = purple
6:  L = white

----------------------------------
Files Handling
--------

All the files required and produced by a Visuaural program should be in the same folder
where the program is (meaning the Visuaural procedure program as described in this document,
not Visuaural itself).

===================================================================

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Version log
------

0.1.1
- a_datacap_rt_nom now records 100 or 0.  Previously was 1 or 0.
- a_datacap_rt_wii_y now continually records wii pitch position.  Previously recorded
zeros when wii was not moving in pitch direction.
```

```
0.1.2
- a_simpleplay has replaced a_play
- a_randomplay command added
- Data capture rate option has been added to the set-adjust-test window.  Available rates
are 4 Hz, 10 Hz and 100 Hz.
- q_endbutton removed from v_txt_qst
- q_nominal, q_img, q_linefreeze, q_contbutton, q_flushbutton and q_contaspace added to
v_txt_qst
- parameter "on" added to v_disptxt
- v_disptxt_count command added



0.1.3
- v_txt_qst q_flushbutton now flushes questionnaire and continues only if all questions
have been responded.



----------------------------------
```

C BINARY SEQUENCES SIMILARITY SOURCE CODE

A simple way to run this code is to copy it to an unformatted text file, change the extension of the file to .m and then open it in Matlab.

```
function [S, d, c, f, l, m] = binseqsi(a,b,L,r)
%BINSEQSI Binary Sequences Similarity
%
%   BINSEQSI(a,b,L,r) where a and b are row vectors of equal or different
%   length. These vectors contain indexes of either value in a binary sequence,
%   therefore they should not have repeated elements within each one.
%
%   L is the length of both sequences.
%   r = 0 turns display of results off.
%   r = 1 turns display of results on (default).
%
%   [S, d, c, f, l, m] = binseqsi(a,b,L,r)
%
%       S: Similarity value between 0 and 1;
%          The greater the value, the more similar the sequences are.
%
%       d: Distance of paired elements.
%
%       c: Closeness of paired elements.
%
%       f: Fraction of paired elements.
%
%       l: Lag of paired elements.
%
%       m: Cell array containing the paired elements of a and b.
%
%   Juan Ignacio Mendoza - 2014

% revision: May 1, 2014

timervalue = tic;

% check input arguments:

err_r = ('binseqsi ERROR: r should be 1 or 0');

if r > 1
    disp(err_r)
    return
elseif r < 0
    disp(err_r)
    return
end

% check that the vectors do not contain zeroes:

if isempty(find([a, b] == 0)) == 0
    disp 'binseqsi ERROR: vectors should not contain zeroes.';
    return
end

% check that L is not smaller than the larger of the indexes:

a = sort(a);
b = sort(b);

largerindex = max(a(end),b(end));

if L < largerindex
    disp 'binseqsi ERROR: Length of sequences should not be smaller than the greatest element of both index vectors.';
    return
end

size_a = length(a);
size_b = length(b);
maxsize = max(size_a, size_b);
minsize = min(size_a, size_b);

% check that the vectors do not contain duplicates:

errdups = ('binseqsi ERROR: vectors should not contain duplicates.');

if length(unique(a)) ~=  size_a
    disp(errdups);
    return
end

if length(unique(b)) ~=  size_b
    disp(errdups);
    return
end

% make reference matrices for each vector:

id_a = repmat(a',1,size_b);
```

```
id_b = repmat(b,size_a,1);

% =====================================================================
% Pair each element of vector b with an element of vector a
% From the paired elements compute Lag, Closeness, Fraction of
% Paired Elements and Similarity.

% distance matrix:

for i_1 = 1:size_a %
    for i_2 = 1:size_b
        distmat(i_1,i_2) = -(a(i_1)-b(i_2));
    end
end

absdistmat = abs(distmat);

% Make a logical matrix indicating the minimum value(s) of each column:

for i_1 = 1:size_a
    mincols(i_1,:) = absdistmat(i_1,:) == min(absdistmat);
end

% Make a logical matrix indicating the minimum value(s) of each row:

for i_1 = 1:size_b
    minrows(:,i_1) = absdistmat(:,i_1) == min(absdistmat,[],2);
end

allmins = mincols .* minrows; % intersection
allmins(allmins == 0) = NaN;

% find to which elements of original a and b do these minimums
% correspond:

from_a = allmins.*id_a;
m{1,1} =  (from_a(isfinite(from_a)))';

from_b = allmins.*id_b;
m{2,1} = (from_b(isfinite(from_b)))';

% compute measures:

l = (nanmean(nanmean(allmins(:) .* distmat(:)))); % lag
d = (nanmean(nanmean(allmins(:) .* absdistmat(:)))); % distance
minunel = min(size(unique(m{1,1}),2),size(unique(m{2,1}),2));

c = exp(-(tand((d*90)/L))); % paired elements closeness
f = minunel/maxsize; % fraction of paired elements
S = c*f;

% =====================================================================
% Display results

if r == 1

    toc(timervalue)
    disp -------------------------------------------------
    disp ' BINARY SEQUENCES SIMILARITY '
    disp ' '
    fprintf(' distance = %f \n', d);
    fprintf(' closeness = %f \n', c);
    fprintf(' lag = %f \n', l);
    fprintf(' fraction of paired elements = %f \n', f);
    disp ' '
    fprintf(' Similarity = %f \n', S);
    disp ' '
    disp 'Paired elements:'
    disp ' '
    disp(m{1,1})
    disp(m{2,1})
    disp -------------------------------------------------

elseif r == 0
    return
end

end
```

D EXPERIMENT 1 PROCEDURE

1) VOICE: Welcome! You are going to listen to several music excerpts. Please press the red button when you hear a change in the music, as soon as possible. The decision of what is a change is up to you. There are no good or bad answers, it only counts what you perceive. You are going to listen to the same musical excerpt five times, so that you can improve your responses on each subsequent opportunity. Before starting the real trials you are going to perform a little training trial. If you need to listen to the instructions again please press the red button, otherwise just wait.

2) VOICE: When you are listening to the music remember to press the red button when there is a change . Press the red button to start.

3) TRAINING EXCERPT ("Walk This Way") - 2 times

5) VOICE: If you need to listen to the instructions and perform the training again please press the red button, otherwise just wait.

6) VOICE: Please press the red button to start.

7) First stimulus (Minuet in G major or Ciguri) - 5 times, real time data capture.

8) VOICE: Now you will be asked about the music. For this question please give a short answer in your own words and opinion, then press the button to advance to the next question. How could you tell when there was a change in the music?

9) VOICE: For this question please answer only ?yes? or ?no? with the appropriate button. Have you heard this piece before?

10) VOICE: For this question please answer only ?yes? or ?no? with the appropriate button. Have you heard this kind of music before?

11) VOICE: For this question please answer with the number buttons. Please rate the degree of familiarity that you have with this music from one to three. One means that you haven?t heard something like this before and three means that you now quite a lot about this music. Two is a middle point: you clearly remember you have listen to it one time or more, but you cannot say you know a lot about it.

12) VOICE: To start rating the next music excerpt, please press the red button.

13) Same procedure from 7 to 11, for the other stimulus.

14) VOICE: You have reached the final stage. Please give a short answer, then press the red button to advance to the next question. Have you been formally or informally trained in music? Please tell what kind of lessons have you had or if you taught yourself, also mention what musical instrument have you learned and if you have learned some kind of music theory. Please give details as you consider necessary.

15) VOICE: And this is the last question. Please give a short answer, then press the red button to end. What are your music listening habits? Do you listen to recorded music, to music in radio, in the TV, do you go to concerts, do you play music? Do you sing? How often?

E EXPERIMENT 3 DATASET

Sound #1

partic.	source	action	cluster
1	baby	laughing	1
2	a baby	he is laughing	1
3	a baby	a baby laughing	1
4	baby	laughing	1
5	a baby	laughing	1
6	baby	baby making sounds	1
7	baby	baby laughing	1
8	Baby	Laughing	1
9	baby	crying	1
10	Baby	Laughter	1
11	baby	laughter	1
12	Baby's voice	laughing	1
13	a baby	a baby laughing	1
14	a baby	laughing	1
15	child	laughing	1
16	baby	laughing	1
17	baby	laughing	1
18	Baby	Giggling	1
19	baby	laughing	1
20	child	laughing	1

Sound #2

partic.	source	action	cluster
1	human	coughing	1
2	man	he is not feeling well	1
3	a man	a man coughing	1
4	man	coughing	1
5	a man	coaching	1
6	man	coughing	1
7	person	coughing	1
8	Man	Coughing	1
9	man	coughing	1
10	Man	Coughing (he's ill)	1
11	person	coughing	1
12	human voice	coughing	1
13	a man	a man coughing	1
14	a human	couching	1
15	male	coughing	1
16	Man	coughing	1
17	man	coughing	1
18	Human male	Coughing	1
19	man	coughing	1
20	man	caughing	1

Sound #3

partic.	source	action	cluster
1	gun	shooting	1
2	gun	war	1
3	a machine gun	shooting	1
4	gun	shooting	1
5	a machine gun	shooting	1
6	automatic weapon	automatic firing	1
7	machine gun	firing a machine gun	1
8	Machinegun	Shooting	1
9	machine gun	firing	1
10	A soldier	A soldier firing a machine gun	1
11	gun	shooting	1
12	machine gun	shooting	1
13	a weapon of these automatic ones	firing	1
14	gun	shooting	1
15	machine gun	firing	1
16	Shotgun	firing	1
17	gun	shooting	1
18	Digital effect	Repeating sound like a machine gun	1
19	gun	gun firing	1
20	machine gun	shooting	1

Sound #4

partic.	source	action	cluster
1	alien	whispering	1
2	fiamma ossidrica	somebody during his job	2
3	an evil presence	saying something in a weird language	1
4	some evil entity	whispering	1
5	a demon	demon says: "where are you?"	1
6	blowtorch	construction working	2
7	gas burner	gas burner is fired up	2
8	Human	Hissing threatingly	1
9	ghost	whispering evil things	1
10	An evil ghost/witch	Whispering loudly (sounds supernatural)	1
11	Voldemort	Voldemort is speaking parseltongue(snake language)	1
12	Speaker	Producing white noise	4
13	an evil whitch in e.g. the Lord of the Rings	calling someone with evil plans on mind	1
14	a mini hoover/wind	blowing	2
15	human	producing noisy sounds with throat and microphone	3
16	Unreal creature like a monster	roaring	1
17	ghost	mourning	1
18	Demon	Speaking	1
19	person/voldemort	whispering creepily	1
20	Gollum	whispering	1

Sound #5

partic.	source	action	cluster
1	plate	scratching	1
2	plate	plate is falling down	1
3	a can	rolling on the ground	1
4	tin plate	swirling on the floor	1
5	the cover of a cookie box	the cover falling down on the floor and spinning	1
6	an object on tarmac	dragging	1
7	toy	toy making rattle	2
8	Uneven metal and round object	Rolling on surface	1
9	metal canister	spinning against hard surface	1
10	A machine at a casino	A slot machine making a signal for people about somebody winning a prize at a casino	3
11	dogfood	dogfood falling inside the dog's plate	4
12	Small metal plate	Spinning the plate	1
13	a telephone	somebody ringing to the telephone	5
14	phone	ringing	5
15	round metallic object	rolling on a concrete floor	1
16	Can	being dragged in the floor	1
17	can	the can droped on the floor	1
18	Plate	Spinning around on its base	1
19	tin lid	lid falling on ground and circling	1
20	alarm clock	wake up sound	5

Sound #6

partic.	source	action	cluster
1	slut machine	coins noise	1
2	slot machine	it is working	1
3	a slot machine	the slot machine spits coins	1
4	slot machine	pouring coins	1
5	a game in a gamehall	winning a lot of money	1
6	slow machine	hitting a winning combo	1
7	slot machine	someone winning money	1
8	Gaming machine	Playing and winning	1
9	lottery machine	winning money	1
10	Game (arcade) machine at a gaming hall	Somebody putting in money and then playing a video game then winning more money	1
11	slot machine	winnning money	1
12	Slot machine	Winning at the slot machine	1
13	a game machine	playing and winning some coins	1
14	playing machine	winning in the game	1
15	gambling game	being played and likely giving winnings	1
16	Slot machine	hitting winning combination and releasing coins	1
17	game machine	clicking	1
18	Gambling machine	Producing sound effects	1
19	gambling machine	money coming out	1
20	game machine	winning money	1

Sound #7

partic.	source	action	cluster
1	birds	singing	1
2	birds	they are singing	1
3	the birds	birds singing in the trees	1
4	birds	chirping	1
5	a group of small birds	the birds fight over a piece of bread on a shore	1
6	animals	commotion in a zoo	1
7	birds	birds screaming	1
8	Bats	Screeching	1
9	birds	singing	1
10	Birds	Singing chirping tweeting	1
11	mice	tehy are talking to each other	1
12	Birds	Chirping	1
13	many birds	birds communicating to each other	1
14	birds	scwirkling (making noise with mouth)	1
15	birds	producing typical bird sounds	1
16	Birds	singing	1
17	bird	the birding is singing	1
18	Birds	Calling	1
19	birds	chirping	1
20	monkeys	making noises	1

Sound #8

partic.	source	action	cluster
1	rain	raining	1
2	water	it s raining	1
3	rain	thick rain falling on the street	1
4	sky or clouds	raining	1
5	a pouring rain	it rains a lot	1
6	water hitting things	rain	1
7	rain	rain falling	1
8	Water	Raining	1
9	rain	rain drops falling	1
10	Rain	What heavy but steady rain sounds like when you’re outside or in a tent	1
11	rain	raining	1
12	rain	rain falling	1
13	water	water falling down	1
14	water	raining	1
15	rain	falling down steadily	1
16	Water	droping heavily	1
17	heaven	raining	1
18	Rain	Contacting a surface	1
19	rain	raining	1
20	clouds	pouring rain falling down	1

Sound #9

partic.	source	action	cluster
1	phone	beeping	1
2	phone	nobody answer	1
3	a phone	the sound the phone makes when you wait for the answer	1
4	telephone	ringing	1
5	a telephone	waiting for someone to answer your call	1
6	phone	phone call waiting to connect	1
7	telephone	busy signal due to no one answering the phone	1
8	Phone signal	Beeping repeatedly	1
9	telephone	ringing (on the caller's end)	1
10	Telephone	The sound you hear when somebody hasn't picked up yet	1
11	telephone	calling somebody on the telephone	1
12	Telephone	Waiting after having dialed a number	1
13	A telephone	Waiting for someone to answer	1
14	telephone	telephone is reserved	1
15	telephone connection	informing that the receiver has been found and waiting for answer	1
16	Phone	calling waiting for the conection to be established	1
17	phone	the phone is ringing	1
18	Telephone	Making a tone	1
19	telephone	ringing	1
20	telefone line	beeping	1

Sound #10

partic.	source	action	cluster
1	human	breathing	1
2	man	he is sleeping	1
3	a man	breathing while sleeping	1
4	man	exhaling or sighing deeply	1
5	a man	being depressed	1
6	older man	deep breathing	1
7	person	breathing	1
8	Man	Sighing	1
9	man	sleeping	1
10	A person who is stalking somebody by calling them	The stalker breathing heavily over a telephone	1
11	person	breathing of a sleeping person	1
12	Human voice	Breathing	1
13	a man	taking a deep breath either because of sad feelings or because of tiredness	1
14	human	sleeping	1
15	male	sleeping loudly and almost snoring	1
16	Man	breathing loudly while sleeping	1
17	people	taking a deep breath	1
18	Man	Breathing in breathing out	1
19	Man	Breathing	1
20	man	breathing	1

Sound #11

partic.	source	action	cluster
1	clock	ticking	1
2	metronomo	it is working	1
3	a clock	a clock ticking	1
4	record	winding	2
5	an old digital metronome	metronome running at about 130	1
6	parts of a machine	parts are hitting each other	3
7	machine	machine malfunctioning	3
8	Metronome	Ticking	1
9	metronome	ticking	1
10	A ball	A ball repeatedly bounced to a surface that makes that kind of sound...	4
11	metronome	tick tock	1
12	Metal balls hitting each other (part of this pendulum-type of device where four metal balls hang next to each other)	Activating the above-mentioned device	4
13	Maybe two stones	hitting the stones against each other	4
14	clock	ticking	1
15	digital metronome	clicking	1
16	Time meter	moving in a pendular way	1
17	clock	the clock is clicking	1
18	Clock	Second hand ticking	1
19	Record player?	Needle skipping	2
20	metronome	tapping	1

Sound #12

partic.	source	action	cluster
1	water	rain	1
2	water	water is boiling?!	2
3	a man	a man urinating too	3
4	cooking pot full of water	boiling	2
5	rain	rain falling on concrete	1
6	a kettle on a stove	burning and boiling	2
7	water	water boiling	2
8	Water	Coming out of the tap	4
9	gas grill	meat cooking	2
10	Part of a jacuzzi	The underwater sound of a water pump that creates the bubbles etc. in a jacuzzi	5
11	pot with water	boiling water	2
12	Oil in a pan on a gas cooker	Frying food	2
13	A small river with a little fall	water falling	4
14	rain	raining	1
15	rain	falling to ground nearby	1
16	Water	hitting the ground in the form of rain	1
17	heaven	raining	1
18	Water	Boiling	2
19	water hitting ground?	raining	1
20	clouds	raining	1

Sound #13

partic.	source	action	cluster
1	toilet	flush sound	1
2	toilet	somebody has finished in toilet	1
3	a toilet	the sound of flushing	1
4	toilet	flushing	1
5	a toilet	flushing a toilet	1
6	toilet	flushing	1
7	toilet seat	toilet seat being flushed	1
8	Toilet	Flushing	1
9	toilet	flushing	1
10	Toilet	Flushing	1
11	toilet	flushing	1
12	Water	Flushing the toilet	1
13	a toilet	flushing the toilet	1
14	toilet	flushing the toilet	1
15	toilet	being flushed	1
16	Toilet water	flushing	1
17	toilet	the water is flowing	1
18	Toilet	Flushing	1
19	toilet	flush	1
20	toilet	flushing	1

Sound #14

partic.	source	action	cluster
1	saw	cutting noise	1
2	something to cut the trees	somebody is cutting trees	1
3	a chainsaw	activated chainsaw	1
4	electric saw	saw blade going round	1
5	a chainsaw	cutting a tree	1
6	chainsaw	throttling the chainsaw	1
7	chainsaw	chainsaw being used	1
8	Chainsaw	Being used	1
9	chainsaw	throttling up	1
10	Chainsaw	Chainsaw running before starting to cut down a tree	1
11	blender	somebody put food in the blender to chop it in little pieces	2
12	Chainsaw	Using the chainsaw	1
13	a chainsaw	getting it started	1
14	motor saw	motor saw put on	1
15	chainsaw	being operated	1
16	Chain saw engine	working without cutting	1
17	hair dryer	the har dryer is running	2
18	Chainsaw	Revving	1
19	chainsaw	chainsawing	1
20	chain saw	chopping down trees	1

Sound #15

partic.	source	action	cluster
1	pig	snoring	1
2	tiger	tiger is attacking	1
3	a bear	a bear roaring	1
4	dog	growling	1
5	a dog	getting nervous	1
6	animal	growling	1
7	bear	bear grunting	1
8	Unidentified feline	Roaring silenty	1
9	lion	groaning	1
10	A big cat (leopard cheetah or something like that)	Growling in distress	1
11	dog	growling	1
12	wild animal	roaring	1
13	An animal maybe a dog	the animal is frigtened or angry and making this sound because of that	1
14	dog	being angry	1
15	an animal	roaring	1
16	Dog	roaring	1
17	cow	the cow is crying	1
18	Dog	Growling	1
19	dog/animal	growling	1
20	bear	growling	1

Sound #16

partic.	source	action	cluster
1	toy	toy noise	1
2	toy	a child is playing	1
3	a squeezing ball	a squeezing ball being squeezed	1
4	teddy bear	squeeking	1
5	a plastic duck	sqeezing the duck	1
6	toy	squishing	1
7	toy	toy being squeeched	1
8	Rubber toy	Squeaking	1
9	rubber duck	squuezing	1
10	Rubber duck	Baby playing with a rubber duck	1
11	kid duck for the bathroom	somebody is squeezing it	1
12	rubber duck	squeezing the rubber duck	1
13	Small child's toy	squeezing it	1
14	a duck made of plastic	squeezing the duck	1
15	rubbery toy	being squeezed	1
16	rubber duck	squicking when pressed	1
17	toy	one chid is playing with the toy	1
18	Toy	Squeaking	1
19	squeaking toy	squeezing toy	1
20	squeeky toy	squeezing	1

Sound #17

partic.	source	action	cluster
1	woman	orgasm	1
2	woman	she is doing sex	1
3	a girl	coming	1
4	woman	having an orgasm	1
5	a woman	enjoying sex	1
6	woman	sex	1
7	person	having an orgasm during sex	1
8	Woman	Moaning	1
9	woman	having sex	1
10	Woman	Having sex and enjoying it	1
11	person	orgasm	1
12	human voice	sexual intercourse	1
13	a woman	having sexual pleasure	1
14	a woman	orgasm	1
15	female	producing an erotic sound	1
16	Woman	expressing sexual pleasure	1
17	woman	hurting	1
18	Human female	Moaning in pleasure	1
19	human	orgasm	1
20	woman	sighing	1

Sound #18

partic.	source	action	cluster
1	man	screaming	1
2	man	he is desperate	1
3	a man	a man shouting for pain	1
4	man	mourning	1
5	a man	acting to be deeply sad	1
6	young man	lamenting	1
7	person	someone screaming out of frustration	1
8	Man	Desperately acting out his feelings	1
9	man	screaming	1
10	Man	Screaming in pain (physical or mental pain)	1
11	person	pain screaming	1
12	human voice	shouting	1
13	a man	crying loudly almost screaming	1
14	man	desperation	1
15	an incompetent actor	trying but failing to believably sound desperate	1
16	Man	yelling in despair	1
17	people	yelling	1
18	Man	Crying kind of	1
19	man	yelling	1
20	man	shouting	1

Sound #19

partic.	source	action	cluster
1	baby	crying	1
2	a baby	he is crying	1
3	a baby	a baby crying	1
4	wolf	howling	2
5	a woman	a woman shouts in a microphone and we hear it through a speaker. Sound is clipping.	3
6	human voice through syntetisizer	pain	4
7	child	child screaming	1
8	Human	Screaming to loudly into microphone	4
9	man	screaming	1
10	A woman(?) screaming to a microphone or something that records or transmits sounds	Screaming (fearfully and maybe in pain)	3
11	baby	crying	1
12	human voice	screaming	4
13	a person man or woman	sreaming but I'm not sure of what kind of emotion	4
14	human	shouting	4
15	voice recording	being distorted in a heavily overdriven signal path	4
16	Evil child	crying	1
17	baby	the baby is crying	1
18	Person	Screaming	4
19	human baby	crying	1
20	game	making noises	5

Sound #20

partic.	source	action	cluster
1	water	wave	1
2	water	movement of the water	1
3	the sea	the water that slowly goes to the beach	1
4	sea	waves breaking on the shore	1
5	a lake and a boat	rowing the boat on a calm lake	2
6	water	wind making waves	1
7	water	water splashing	1
8	Water	Interrupted natural flowing	1
9	lake shore	small waves caressing the shoreline	1
10	A person swimming	Someone slowly swimming in still water	3
11	sea	small waves	1
12	Surface of a lake	Rowing	2
13	water in a lake or seaside	small waves hitting the land	1
14	boat	rowing	2
15	water waves	splashing against objects	1
16	Boat paddle	entering the water and moving	2
17	river	the water is flowing	1
18	Water	Lapping	1
19	water	someone putting hands through water	1
20	boat on a lake	rowing	2

Sound #21

partic.	source	action	cluster
1	people	cheering	1
2	people	their team has won	1
3	a group of people	exultating for something good	1
4	people	cheering	1
5	a group of people	they are watching sport and someone makes a goal	1
6	people	cheering	1
7	people	cheering	1
8	People	Cheering	1
9	people	cheering	1
10	People	Cheering and applauding	1
11	people	cheering	1
12	Multiple human voices	Cheering	1
13	a small crowd	people hurraying for e.g. a win in sports	1
14	group of people	cheering	1
15	crowd of people	celebrating a victory	1
16	Group of people composed by men and women	yelling in joy and clapping	1
17	people	cheering	1
18	People	Cheering celebrating	1
19	people	cheering/celebrating	1
20	people	cheering	1

Sound #22

partic.	source	action	cluster
1	thunder	strike	1
2	nature	tempest starts	1
3	a storm	the beginning of a storm	1
4	sky	thundering	1
5	a thunder	a lightning in nature	1
6	thunder	lightning	1
7	thunder	thunder rolling	1
8	Thuderstorm	Rumbling and lightning striking	1
9	thunderstorm	lightning	1
10	Thunder clouds	Thunder rumbling after a lightning strike	1
11	thunder and lightning	thunder	1
12	Thunderstorm	Electric discharge in the atmosphere	1
13	a thunderstorm	thunder after the lightnings	1
14	thunder	thundering	1
15	lightning	striking nearby	1
16	Thunder storm	striking	1
17	heaven	thunder	1
18	Lightning	Heating and ionising the air thunder	1
19	thunder	thundering	1
20	lightning and thunder	thundering	1

Sound #23

partic.	source	action	cluster
1	wood	burning	1
2	fire	it is burning some pieces of wood	1
3	a man	a man urinating	2
4	wood fire	burning	1
5	a fireplace and someone cutting wood with an axe	the fire burns and someone cuts wood	1
6	fireplace	burning wood	1
7	fire	wood burning in a fire	1
8	Fireplace bonfire	Burning	1
9	bonfire	burning	1
10	Fire	Firewood crackling. It's a fire that is held inside somewhere	1
11	fire	crackling wood	1
12	fire	fire burning	1
13	a fire-place	the fire burning in it	1
14	fire	wood burning	1
15	fireplace	burning	1
16	Fire	burning and crackling	1
17	fire	the fire is blazing	1
18	Wood fire	Burning crackling	1
19	fire	fire crackling	1
20	fire	cracking	1

Sound #24

partic.	source	action	cluster
1	bike chain	circyling	1
2	bicicle	it is in movement	1
3	bicycle chain	moving	1
4	bicycle	chain going round and pedaling	1
5	a bicycle	testing/repairing a bicycles chains	1
6	bicycle	pedalling and then rolling	1
7	bicycle	gears	1
8	Fishing rod	Spinning	1
9	bike wheel	bike wheel turning and slowing down (on a bike turned upside down)	1
10	Some kind of mechanic thing you wind and unwind	Somebody throwing something and then the mechanic thing slowing down	1
11	fishing stick	somebody is fishing	1
12	Bike	Pushing the pedals	1
13	a bicicle	spinning the wheel of it	1
14	the thing that you use to fish	throwing the hook to the sea	1
15	ball bearing	rotating and then slowing down	1
16	Fishing cane	the thread is being pulled and makes the roulette spin	1
17	sewing machine	the sewing machine is running	2
18	Line and reel	Reeling	1
19	Fishing rod?	Fishing line being let out	1
20	bicycle wheel	rolling	1