

# Self awareness and time dilatation: a musical study to analyze the alteration of the subjective perception of time.

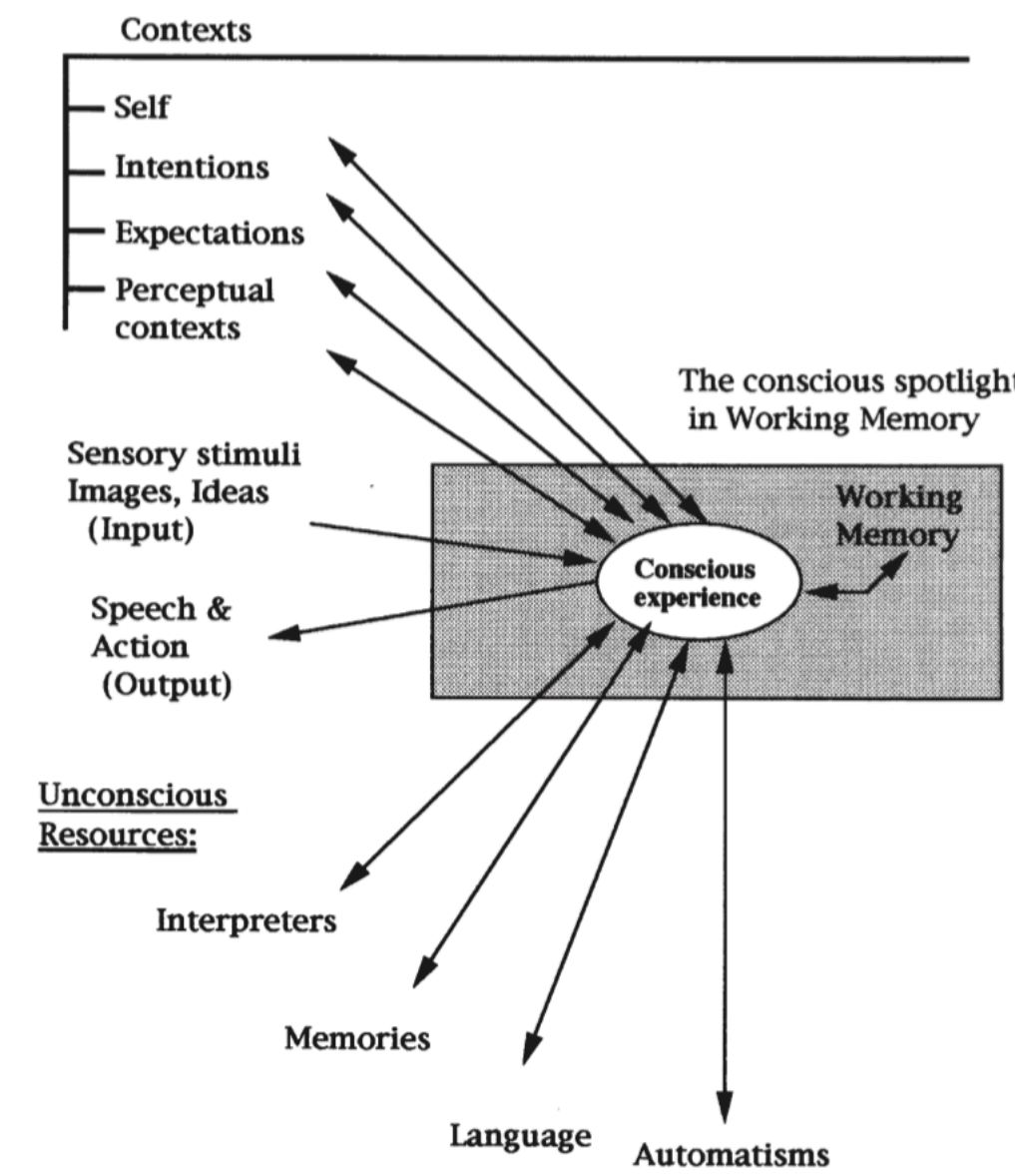


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## Introduction

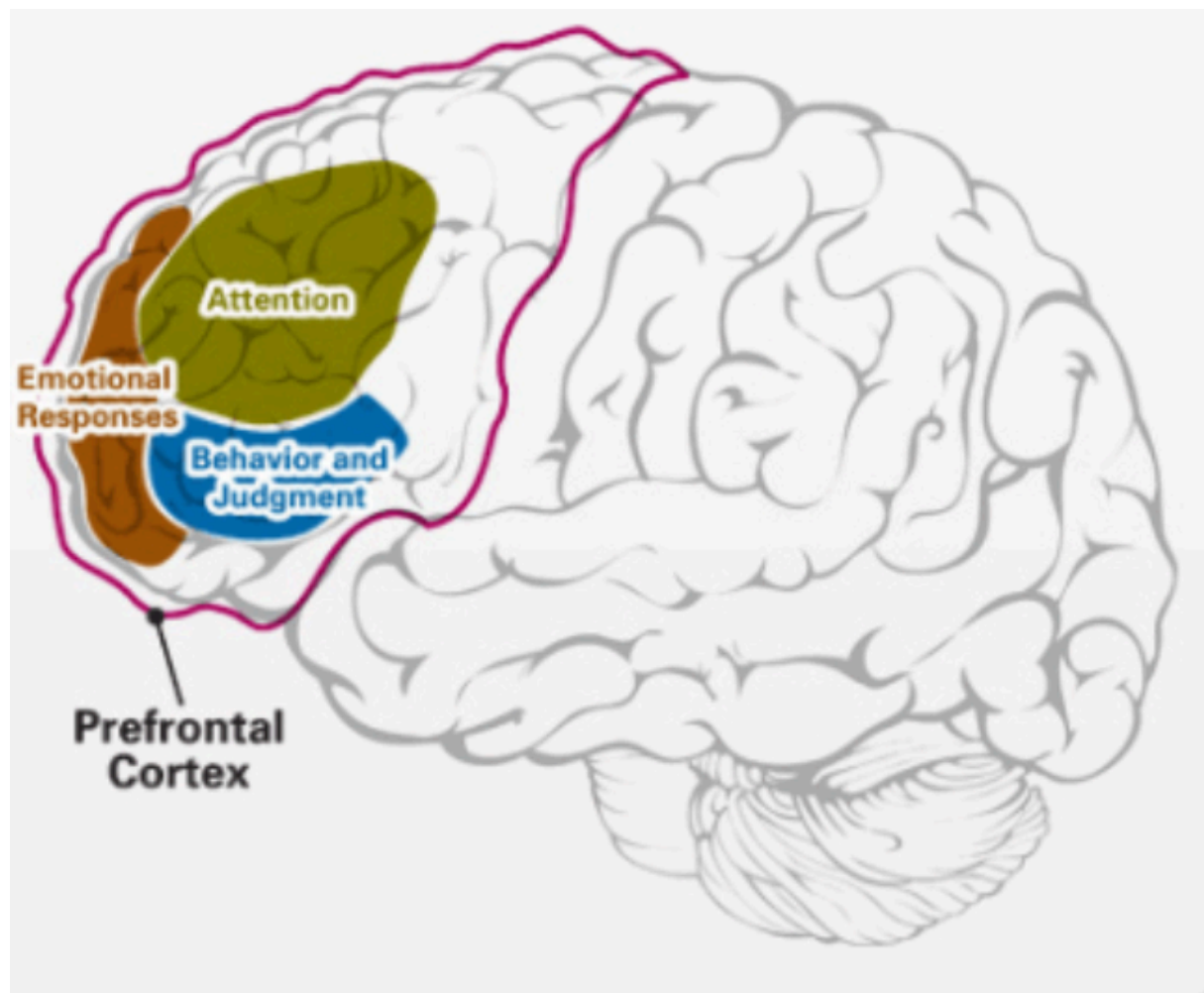
There is an established and growing body of evidence highlighting that music can influence and distort our sense of time. Despite that, this interrelation has not been widely and deeply investigated and the mechanisms are un- known. The notion that time is a construction rather than a perception is intrinsic to phenomenological approaches to time consciousness. The research literature on timing reflects the debate on subjective timing effects, especially when time is estimated (memorized) after an event has happened.

From a neuroanatomical interpretation, taking into account the most recent global work space metaphor of consciousness [1], Baars et al. (2003) suggest that conscious perception may entail a dialog between specific self- related prefrontal regions and sensory cortex. Going through the recent literature of brain imaging, we can find a consistent quantity of data with regards to sensory cortex on the one hand, and self-related regions on the other, but very little information is available concerning their potential interplay or co-activation. Our scope of the research is to analyze the alteration of the subjective perception of time by means of an ubiquitous daily activity that easily affects people’s normal state of consciousness, *listening to music*.



Global work space metaphor schema

The experiment consists of two conditions: (1) an **introspective condition** (“introspection”) where the subjects are required to self-introspect about their own emotional responses (aroused versus neutral) toward classical instrument musical clips as auditory object; (2) a **categorization condition**, in which the subjects, having identical stimuli, are required, in fact, to categorize them, reporting whether a musical instrument (eg, a trumpet) is playing in the stimuli, or, in another case, report how many different instruments are simultaneously playing.



## Materials and Methods

### The Experiment Interface

- The experiment has been set up using Python.
- In order to make it accessible on an online platform, to collect as much data as possible, it has been made use of the software PsychoPi (<https://www.psychopy.org>)
- The software, also allowed to set various aspects of the experiment, such as the size of the window to be used or what information is gathered about the subject and determine what outputs (data files) will be generated, which would be then fundamental to carry on a statistical research by means of the software SPSS.

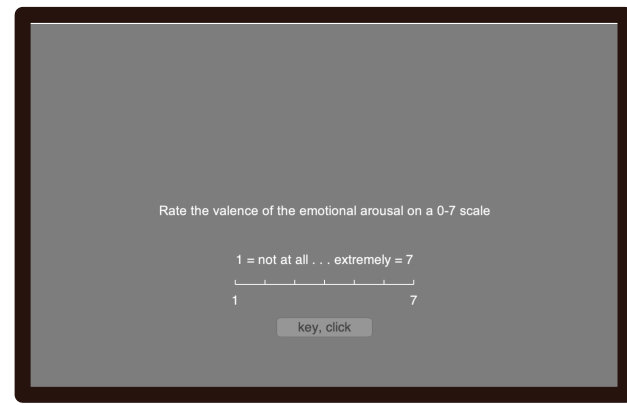


Python code - trial

### Subject, variables

The size of the sample will be of 300 subjects, the variables will be the following:

- Answers to an initial questionnaire with a closed questions structure
- Records of each temporal bisection task for each condition
- Rating task records
- Instrument identification records



Rating task screen

### Structure

#### Introspection task

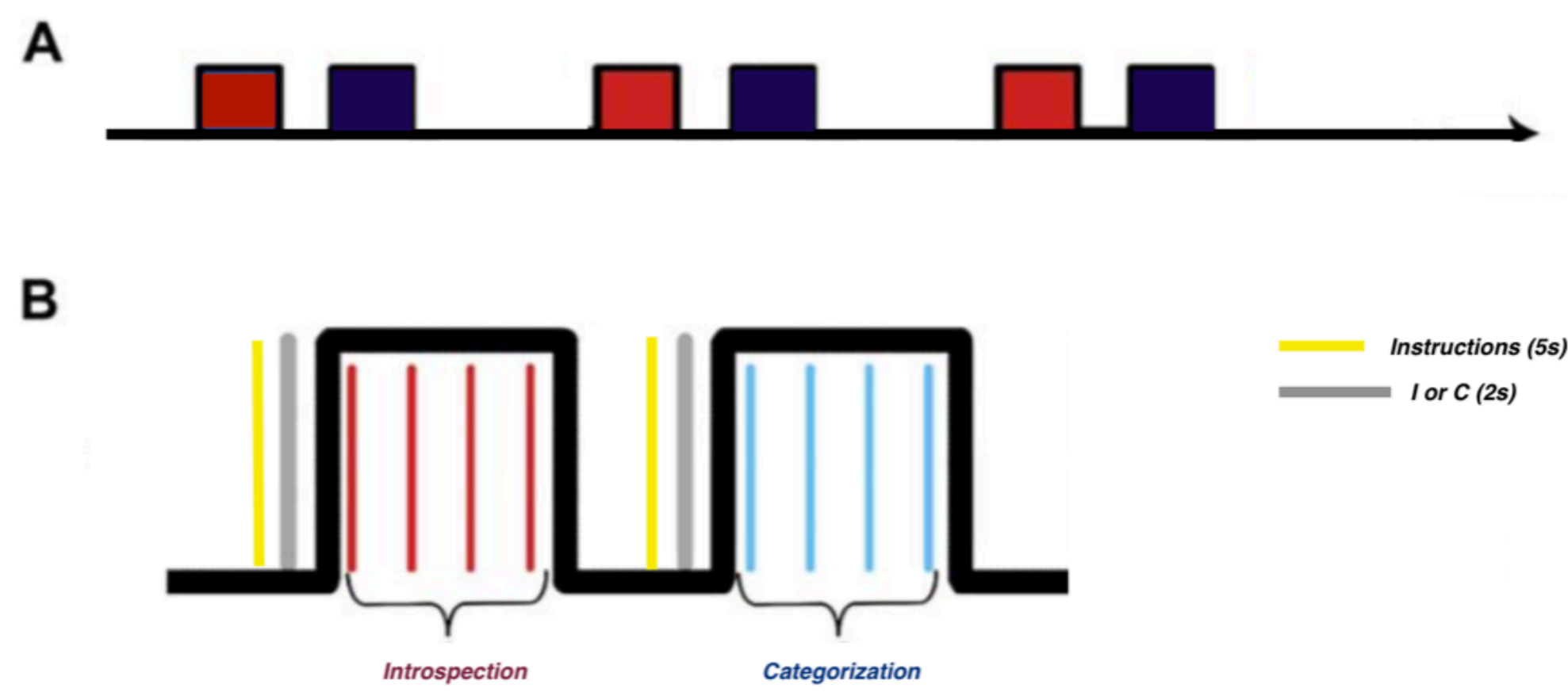
In the introspection task, subjects are asked to hear an audio and then self-introspected about the emotional response elicited in them by these stimuli. Hence, indicate the emotional valence felt during the listening on an increasing 0 to 7 rating scale, where 0 is sad . After, they will be asked to press and hold the space bar for the same duration as an attempt to reproduce the duration of the audio as accurately as possible.

#### Categorization task

In the categorization task, after have heard the musical clip, the subject will be asked to (1 or 2):

- Determine whether a certain instrument was being played or not
- Determine how many playing instruments he or she recognized . As in the introspection task, their attempt then will be again to press and hold down the space bar for the estimated duration of the musical clip.

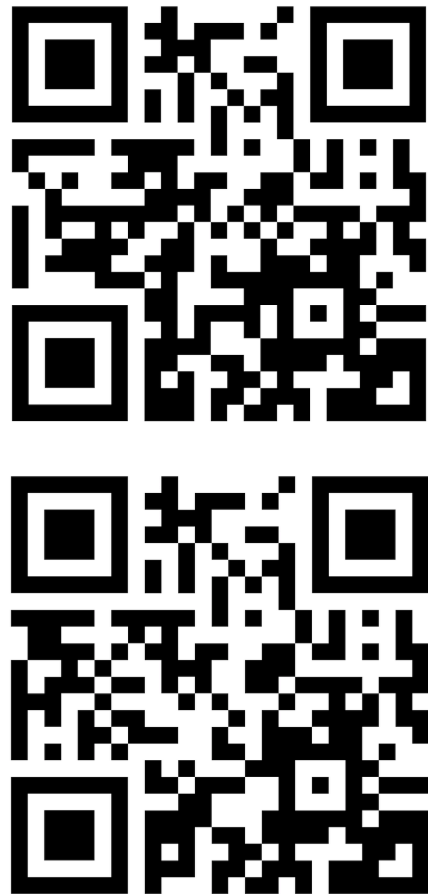
### Experimental paradigm



The above schema shows the structure of a block of tasks from the experiment

### Stimuli - Audio

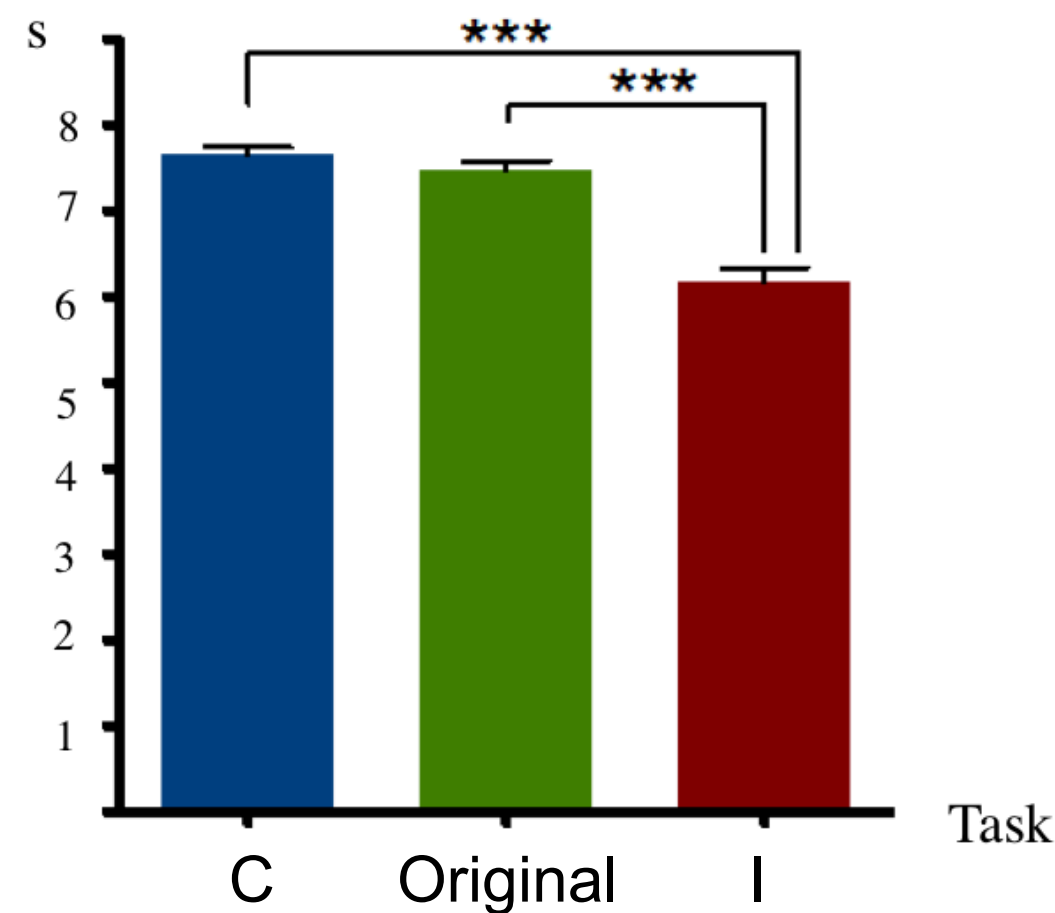
Audio stimuli will consist of short musical clips sampled from different fusion jazz clips. The length of each audio is between 6 and 10 seconds and the set of all of those is **normally** distributed. This choice has been taken in order to make probabilistic assumptions referring on the difference between them and the attempts from the subjects. The interface software will be coded in Python and the auditory stimuli should be delivered via high resolution headphones.



These QR code are four samples extract from the experiment

### Results expected

From the results of a study investigating the effect on time estimation of musical parameters associated with emotional changes in affective valence and arousal [2], we’re expecting that during the first task, averagely, an over reproduction of the temporal interval. On the other hand, since the lack of the predicted lack of self- awareness experience, we want to prove an averagely more accuracy on the reproduction of the temporal interval referred to the second task.



## Conclusions

If the anticipated results are to be obtained, this would lead to the hypothesis stating the significance of music as a tool to indicate to what extent self-related regions and sensory cortex co-activate during sensory perception.

Furthermore, such a convergence of neurological and psychological evidence could suggest that a certain set of brain structures could be indicated as the physiological basis of self-related representation

Since the cognitive task (in the experiment) is the only difference between the two conditions, we expect this contrast to highlight self-related areas and areas involved in reflective processes.

Although these assumptions are likely to be relevant, it is important to notice that the lack of physical analysis, as could be in the case of a fMRI, limits the reliability of the above hypothesis.

## Literature Cited

- [1] Bernard J. Baars, *Global workspace theory of consciousness: toward a cognitive neuroscience of human experience*, Progress in Brain Research, Volume 150, 2005, Pages 45-53
- [2] S. Droit-Volet, D. Ramos, *Music, emotion, and time perception: the influence of subjective emotional valence and arousal*, Front Psychol. 2013; 4: 417, doi: 10.3389/fpsyg.2013.00417