Time In MEntaL activitY: theoretical, behavioral, bioimaging, and clinical perspectives (TIMELY)

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DRAFT
MEMORANDUM OF UNDERSTANDING
For the implementation of a European Concerted Research Action designated as COST ACTION XXXX
Time In MEntaL activitY: theoretical, behavioral, bioimaging, and clinical perspectives (TIMELY)

The Parties to this "Memorandum of Understanding", declaring their common intention to participate in the concerted Action referred to above and described in the "technical Annex to the Memorandum", have reached the following understanding:

1. The Action will be carried out in accordance with the provisions of document COST 270/07 "Rules and Procedures for Implementing COST Actions", or in any new document amending or replacing it, the contents of which the Parties are fully aware of.
2. The main objective of the Action is to advance the understanding of the processes underlying time perception by exploring the relevant multidisciplinary theoretical, behavioral, neurobiological, and clinical perspectives.
3. The economic dimension of the activities carried out under the Action has been estimated, on the basis of information available during the planning of the Action, at Euro 12 million in 2009 prices.
4. The Memorandum of Understanding will take effect on being accepted by at least five Parties.
5. The Memorandum of Understanding will remain in force for a period of four years, calculated from the date of the first meeting of the Management Committee, unless the duration of the Action is modified according to the provisions of Chapter V of the document referred to in Point 1 above.

Part I - Draft Technical Annex

A. ABSTRACT & KEYWORDS

A.1 ABSTRACT

Time perception (TP) represents a fundamental issue in cognitive science and neurosciences. However, the cognitive mechanisms and brain areas involved are still underspecified. Uncovering the processes underlying TP will specify its interactions with action, attention, memory, and language and will make crucial contributions to our understanding of longstanding questions on various aspects of time (synchrony, duration, etc.). To investigate TP one has to move away from the single-discipline perspective and profit from the synergy of theoretical and methodological inputs from different disciplines. Currently, time research is spread out across European and international laboratories. Advancement in the study of TP poses a challenge and, thus, it requires the coordination of actions within the EU community and internationally. This Action aims to develop a scientific network that will establish the first European community on TP and advance our understanding of TP by coordinating efforts on: a) developing a common-code of communication; b) advancing the understanding and treatment/neurorehabilitation of time distortions in neurological and mental disorders or other impairments; c) developing new behavioral/imaging paradigms; d) creating new research materials; d) studying developmental aspects of TP. The essence of this Action is a multidisciplinary union of senior and junior scientists who work on TP.

A.2 KEYWORDS

Time metaphors, Temporal processing, Perception-Action, Neuroimaging, Neurorehabilitation

B. BACKGROUND

B.1 General Background

An important issue in the framework of Cognitive Science is time perception (TP). Researchers have attempted to study time from various aspects (e.g., order, duration, synchrony). For example, an event (e.g., an individual talking) may consist of two sensory inputs (e.g., the auditory-speech and visual lip-movements) that, even though they are produced simultaneously from a particular source (the speaker), are not received at the human sensory receptors at the same time. Thus, one wonders how we perceive synchronous multisensory events, given that different sensory systems require varying amounts of time to receive and process a given input. Longstanding questions relate to the neural and cognitive mechanisms controlling TP. How does TP become distorted in people with/without neurological/psychiatric conditions and what factors modulate this change? How can we advance neurorehabilitation through the study of TP? How does TP develop in children and changes in elderly? Other questions concern time's interactions with action and space, memory, attention, language, and consciousness. Extending to real-world applications, TP is critical with important practical implications. For example, multimodal user interfaces (e.g., gaming, virtual reality, telecommunications) are dependent on the appropriate timing of the transmitted signals in order to provide the user with the percept of a realistic multimodal event.

Until now, scientists have been trying to answer these fundamental questions, most often from a single-discipline perspective. It is clear, however, that multiple disciplines must interact in order to resolve these questions. To this day this union has not been attempted. Thus, this COST Action will address TP issues by bringing together senior and junior scientists involved in the study of time from different perspectives. This will allow: exchange of ideas and expertise, creation of research materials and tools, and the creation of a network for a common multidisciplinary effort to disentangle the issues of TP.

To date, researchers have produced new knowledge on TP that is coupled with many problems (within and across disciplines) and a number of unresolved issues, such as:

- *Conceptual analysis and measurement of time*: Currently, there is no common code of communication as to the different aspects of TP. A debatable definition also leads to problematic measurement methodologies. Reaching an agreement regarding the conceptual analysis of time will also lead to more efficient and accurate measures of the human and animal TP.
- *Exploring factors associated with TP variability*: High variability in TP has been reported within and between individuals. This variability represents a barrier in understanding TP. Thus, a close examination of various cognitive/biological processes is needed.
- *Extending time research to ecologically-valid stimuli*: The majority of TP research has focused on simple stimuli (unimodal/multimodal but informationally-poor stimuli, e.g., auditory beeps/visual flashes), necessitating the use of more informationally-rich stimuli (e.g., music) for advancing TP research.
- *Uncovering the neural correlates of TP*: Advances in neuroimaging allow observing the brain-in-action. It is necessary to identify the techniques appropriate

for studying TP in both animals and humans and for examining time distortions in specific neurological/psychiatric conditions and other impairments (e.g., learning disabilities).

This Action aims to coordinate ongoing research on TP within the European Union (EU) and internationally in order to create a strong multidisciplinary network that will address the challenges on TP and define new lines of research. Specifically, this Action's main aim is to: create the first multidisciplinary European time community of senior and junior scientists and develop international collaborations to exchange expertise.

The Action's pertinence is evidenced by the fact that currently 17 EU (including a cooperative state) and 5 international countries and many well-known researchers in the field of TP have already accepted to join this effort (see Part II, Section A).

COST is the appropriate source for this Action, since it encourages:

- conducting networking activities through close interaction between partners and fruitful discussions with external experts through meetings, conferences, Short Term Scientific Missions (STSMs);
- facilitating effective dissemination of results/tools by involving multidisciplinary communities in EU and internationally;
- bringing together existing lines of research, thus enhancing community-building in EU;
- flexibility and the continuous joining of other potential participants when the Action is running.

B.2 Current state of knowledge

Conceptual analysis and measurement of time: The concept of time, and how humans perceive it, comprises one of the most essential aspects of our everyday life. It comes as no surprise therefore that time is a concept that has intrigued philosophers, biologists, physicists, and psychologists for a long time. For example, the Greek philosopher Aristotle was the first to ask (in psychological terms) about the way we perceive time. Aristotle perceived time as a 'kind of number' and considered it as "a number of change with respect to the before and after". Since then the interest on TP has grown and for some fields, time has become an important experimental variable to be defined and controlled in laboratory settings.

The 19th and 20th centuries have met with the development of new laboratory techniques and technological advances that put TP at the forefront of the Cognitive Neurosciences and also of more applied fields (e.g., entertainment/communication technologies). Nowadays, TP represents one of the most relevant issues for research with important links to studies related to consciousness and human sensation and perception. Recently, the link between TP and consciousness has become even more pronounced with the growth of a new area of research on the concept of chronesthesia (the awareness of subjective time as opposed to the awareness of the world or of self-in-time).

The study of time is currently enjoying a lot of attention from scientists worldwide. However, what concept of time is being studied in each laboratory, and what do the findings tell us? The main issue here relates to the operational definition of time. In the literature, one will find terms such as time sense, psychological time, temporal reasoning, psychological moment etc. The problematic issues associated with the operational definition of time extend to the measurement of TP. For instance, some researchers measure TP using discrimination, motor tapping, duration, and order

judgment tasks, to name just a few. What do each of these tasks actually measures and are they accurate? In order to answer such questions a deeper conceptual analysis of time is needed.

Researchers involved in the study of time are aware of these issues and attempts are often made to resolve them; a recent example of such an attempt is the session "What is time and how to measure it?" at the 12th International Symposium on Rhythm Perception and Production Workshop held in July 2009 in Lille, France. To this date, however, there is no orchestrated multidisciplinary network to resolve the definitional/measurement issues of human and animal TP. This Action aims to satisfy the need for a common network in understanding TP.

Exploring factors associated with TP variability: One more longstanding issue in the study of TP relates to the differences observed from individual to individual and their underlying causes. Previous research has shown that TP is affected by cognitive development and decline, gender, severe developmental disorders, acquired brain damage, etc. TP variability may also be dues to other factors like memory and attention. Time is closely linked to many aspects of perception and cognition, these links must be studied in order to better understand TP and allow for better theories on the processes underlying TP.

Empirical findings indicate that, beginning as early as the second month of life human infants can integrate multisensory events on the basis of time; thus implying that TP is a critical component in human development. The infant's experience of time, however, is quite different from that of adults. That is, they are inexperienced with time, and if developmental experience promotes improvement in TP abilities, then infants should be relatively poor in this regard. In addition, the rate of sensory neural transmission in the infant's nervous system is slower due to low maturation levels of the neural processes. This notion seems correct but studies with elderly are very limited in order to support it. Thus, using a developmental approach will provide valuable information regarding the time course of TP, but most importantly will allow investigation of the neural mechanisms underlying TP.

Memory and attention are two cognitive processes closely linked with time. The interplay between TP and memory has been investigated in various ways. Autobiographical memory and retrospective duration judgments (i.e., when a past event occurred and the duration of that event, respectively) and prospective memory (i.e., future intentions) are some examples of this interplay. To date, several models have been proposed for the link of TP and memory (e.g., temporal distinctiveness models); however, no unified model has been proposed. Another important relationship is that of attention and TP. For instance, one's perceived duration of a given event can be modulated by attention alone: increasing the events' perceived duration when attended, while shortening its duration when unattended. Thus, attention can have effects on one's temporal percept of a given event. It is necessary therefore to further address the relationships between memory, attention, and TP.

Culture and language represent another set of variables related to TP. A generally accepted notion is that time moves forward and that events happen in a unidirectional fashion. This is reflected through language, where in most cases people from various cultures use spatial metaphors to talk about time (e.g., looking "forward" to lunch). Recent research has demonstrated that people whose native language conceptualizes time

with a different directionality (vertical vs. horizontal) interpret statements regarding time differently. Thus, suggesting that our concept of time is modulated by the way a given language associates the concepts of time and space. What happens in the cases where the concept of time is ambiguously represented in a language? The Hindi language uses only one word "kal" for both "yesterday" and "tomorrow" with the meaning being determined by the context. Similar questions can be raised for interaction of gestures-culture and TP. For example, the Aymara people of South America have a reverse concept of time by gesturing the past ahead and the future behind in space. It is pertinent therefore to study TP in terms of language, gesture, and culture, in order to define its different representations and how they shape our perceptions.

In general, there seems to be a tension between static and dynamic ideas of time. The analysis of static structure of events versus dynamic flow of time is fundamental within modern philosophy of time and the study of temporal logic. The conceptual analysis based on temporal logic may lead to a deeper understanding of time relevant for the study of TP.

Extending time research to ecologically-valid stimuli: In an attempt to investigate TP, early research studies focused on the use of simple, low-informational content stimuli. While such studies have successfully put TP at the forefront of multisensory processing and identified a number of the key factors modulating it, it is now appropriate to start investigating TP of more complex, ecologically-valid stimuli (e.g., speech, musical, or action stimuli).

The last five years a number of researchers have started more vigorously investigating TP of more complex stimuli. Although the use of complex stimuli is essential for answering fundamental questions regarding TP, some unavoidable problems exist. Specifically, the: a) quality of the stimuli used is frequently put in question since processing power and recording limitations lead to time inaccuracies; b) use of musical stimuli is still lagging, making it's necessity greater (given that musical research can lead to perceptual comparisons with speech and action data); c) use of complex stimuli for imaging research is often difficult due to the nature of the stimuli and the technique's limitations; and d) results from studies using complex stimuli have not been systematically used for the development of real-world applications (e.g., identifying reading impairments based on rhythm perception, refining the International Telecommunication Union (ITU) recommendations in terms of audiovisual timing for broadcasting). The problems associated with the investigation of TP using complex stimuli are challenging. A coordinated Action, such as this COST Action, targeting those problems should offer the opportunity for better controlled stimuli and comparable results.

Uncovering the neural correlates of TP: In order to advance the understanding of TP, it is essential to investigate the existence of specialized brain systems for representing time and the specific structures involved. The sensitivity (i.e., accurate timing) and complexity (i.e., all the possible processes involved) of this issue, however, renders TP an aspect of human and animal perception that has been difficult to study directly, despite the recent advances in modelling, animal experimentation, and imaging techniques.

Research to date has provided strong evidence that specific structures in the human brain play a role in the processing of temporal information (e.g., basal ganglia, premotor and motor cortex, superior temporal gyrus, inferior prefrontal cortices). The cerebellum, for example, is argued to be involved in a variety of tasks such as speech

perception/production, where the timing of brief intervals is an important component. However, it is not yet clear whether or not the cerebellum is involved only in the short-interval timing, or whether it covers a wide duration range. Recent evidence also showed that the parietal cortex is involved in the processing of temporal intervals. Studies of patients with right parietal stroke have shown decreased temporal order sensitivity for visual stimuli in the contralesional side of space. Such findings, suggest that the right parietal cortex may also play an important role in multisensory integration as a function of time and space.

Animal research on interval timing has developed substantially in the last 20-30 years, and many fundamental processes have been elucidated. However, the expanding body of data has also yielded exceptions to the rules, violations of properties, and therefore multiplication of theories. On the neurobiological side, interest has been more recent, but grows exponentially. Data so far are in general agreement with the human literature, although some discrepancies have appeared, raising questions about how similar or different timing processes might be between animals and humans. Animal research, allows accessing tools and techniques that cannot be easily applied to humans. However, as much as experimental parameters can impact the behavioural output, interpretation of neurobiological data is highly dependent on the procedures used. With the multiplicity of techniques already available and new ones to come, it is time to create a common network and database, pivot for future research. For this to be fruitful, it is crucial to cooperate at world-scale in order to profit from the diversity of multidisciplinary TP approaches on both humans and animals.

Overall, researchers have identified some areas in the human and animal brain that are responsible or play a role in TP. However, the questions regarding the neural underpinnings of TP are many. The research community must, therefore, network in order to identify: the appropriate imaging methodology for measuring different aspects of TP and the level of complexity a certain stimulus can reach under a Positron Emission Tomography (PET), functional Magnetic Resonance Imagery (fMRI), etc. setting. This Action will create the ideal condition not only for building a consensus in methodological aspects common to animal and human research, but also for the emergence of a unified theory of TP, both at psychological and neurobiological level.

Understanding of TP is also critical in clinical populations. For example, neglect patients (i.e., patient fails to report/react to stimuli located in the space contralateral to the lesion) mainly show an impairment related to a spatial component of an event, however, neglect can also be observed in the temporal domain. Additionally, patients suffering from schizophrenia/depression/bipolar disorder experience a disorganized TP. Finally, in studies with dyslexic patients, a deficit in the processing of rapidly presented stimuli has been demonstrated. It seems therefore that other disorders (e.g., aphasia) may have a temporal component that has not been explored yet. Brain functional neuroimaging studies should contribute to investigate the interactions between TP and well-known neural networks involved in attention, memory, space perception or action.

B.3 Reasons for the Action

The accurate perception of time is critical for almost every behavior we engage in. Furthermore, research has shown that certain neurological conditions can potentially represent disorders that are actually related to TP rather than to other processes. The study of time spans many disciplines and the recent renewed interest in uncovering the

underlying mechanisms of TP, along with the continuous advancement of technology provides an excellent time for this Action. This Action will allow: significant advancement in the study of time, extension of theories to real-world applications, and the creation of a unique European network with international collaborations that will contribute to the training of new researchers and the creation of new lines of research. Most importantly, this Action will put Europe at the forefront of TP research.

B.4 Complementarity with other research programmes (if appropriate)

This Action is not only important but also unique, since no similar effort has been proposed or planned (to our knowledge) in COST or any other funding source worldwide. There is the *International Society for the Study of Time (ISST)*, a community of researchers working on time but with a different focus than the one proposed here. That is, the focus of ISST being more aligned with a cultural, historical and/or scientific metaview of the concept of time, rather than on TP specifically. This COST Action will thus seek to create a bridge with ISST, therefore expanding the possibilities for collaboration and subsequently enhancing the efforts of community-building on TP.

This Action will also liaison collaboration and exchange of expertise with the following projects/networks (see Section E.3 for more details): Consciousness: A Transdisciplinary, Integrated Approach (COST BM0605); Space, Time and Numbers in the Brain (STANIB); Helping Autism-diagnosed teenagers Navigating and Developing Socially (HANDS).

C. OBJECTIVES AND BENEFITS

C.1 Main/primary objectives

The main objective of the Action is to advance the understanding of the processes underlying TP by exploring the relevant multidisciplinary theoretical, behavioral, neurobiological, and clinical perspectives.

C.2 Secondary objectives

The main objective of this Action is realized by the following general secondary objectives (see Section D.2. for a more detailed account):

- *Objective A*: Critically examine the current definitions and measurements methods associated with TP. Develop a common code of communication for TP and new behavioral/imaging paradigms for measuring TP.
- *Objective B*: Critically examine the links between time and: memory, attention, language, culture, and particularly to emphasize on the TP changes observed in infants and elderly.
- *Objective C*: Critically examine the appropriate path of utilizing complex stimuli in TP research and create new research materials and tools.
- *Objective D*: Critically examine the research on the neural correlates of TP and develop theories of how TP is represented in the brain. In addition, to advance the understanding and treatment/neurorehabilitation of time distortions in neurological and mental disorders or other impairments.
- *Objective E*: Provide young researchers with training opportunities through the diverse expertise and research projects being integrated in this Action.

C.3 How will the objectives be achieved?

The essence of this Action is the multidisciplinary union of senior and junior researchers in the field of TP. Thus, the Action will be a synergy of scientists from philosophy, linguistics, musicology, and cognitive, neurobiological, medical, and computational sciences. This union brings not only multiple perspectives from different disciplines to this Action, but also broad experiences, different expertise, and fresh/new/innovative ideas.

The means to achieve the above mentioned objectives are:

1. Training Schools and Conferences with “Think Tank” meetings focused on the generation of new ideas and creation of new lines of research.
2. Scientific Dissemination Meetings.
3. Working Group (WGs) Meetings and core group meetings focused on addressing Action issues and identifying potential collaborations.
4. STSMs implementing the identified collaborations.
5. Electronic tools to facilitate interactions, collaborations, knowledge-building, and dissemination: A web site providing detailed information about ongoing research, conferences, training opportunities; a forum/blog for useful and continuous discussions; Action and WG mailing lists; an e-print archive.

6. Scientific writings: scholarly publications in books and leading journals, reports from WG Meetings, Conferences, and Training School proceedings, and high-level training materials for junior scientists.

C.4 Benefits of the Action

The expected scientific impact of the Action is to: a) bring greater coherence and visibility to the field as a whole, b) foster new collaborative research and organize progress in the field, and c) provide multidisciplinary training for young scientists. The benefits associated with this Action are many, but the highlight will be on the: a) advancement of the study of time; b) development of new research materials; c) development of new research approaches and neurorehabilitation applications; d) exploration of the links between animal and human research on TP.

C.5 Target groups/end users

The target audience of the Action includes:

- Researchers in many fields (e.g., neuroscience, psychology, philosophy, musicology) and mental and medical health professionals
- Academic researchers and educators associated with online learning facilities
- Multimedia industries and representatives from standardization bodies (e.g., ITU)
- Young researchers aiming at interdisciplinary research and practice
- Software and psychophysical/imaging measuring tools engineers

D. SCIENTIFIC PROGRAMME

D.1 Scientific focus

The main objective of this Action is to advance the understanding of the mechanisms underlying TP by resolving existing problems and improving current knowledge on issues related with: definition and measurement, new experimental approaches, developmental aspects, differences as a function of the individual, gender, culture, and language; neural correlates and clinical issues.

D.2 Scientific work plan – methods and means

The Action's objectives will be accomplished through the efforts of four multidisciplinary WGs. The Action will last for a total of four years. WGs and core groups will meet several times during the four years of this Action. These meetings will include not only independent WGs but also collaborating WGs. Close transdisciplinary interactions are critical for the Action's progress to be achieved. Three open workshops will be organized as satellite events of international meetings or related conferences (e.g., Cognitive Science Society, International Multisensory Research Forum, Cognitive Neuroscience) to disseminate the WGs' outcomes and to invite more input from other researchers. The second year and towards the end of the Action's lifetime, a Conference will be held to conclude the work of the Action and to plan for the future of the established TP network. The Workshops and Conferences will facilitate research exchanges by inviting contributions on the topics of interest from European and international researchers.

In addition, two interdisciplinary training schools will be organized in the first and third year of the Action. They aim to motivate and inspire early stage PhD students with research ideas pertaining to the Action which they may consider to pursue in their doctoral studies. Besides, the training enables the building of research networks, laying the ground for STSMs during the Action's lifetime and fostering a longer-term collaboration. Throughout the Action's duration, the partners are expected to participate (in total) in at least 4 STSMs per year in order to gain the full benefits of the multidisciplinary interaction that this Action offers.

The scientific objectives of this Action's multidisciplinary look on TP will be accomplished through four main topics (see B.2 for more details):

WG1- Conceptual analysis and methodology for measuring TP. Time is a difficult concept to grasp and a difficult percept to measure. Different measurement tasks often lead to conflicting results, thus questioning the actual reliability of the tasks currently used.

Expected outcomes:

a) In-depth conceptual analysis of time and review of the operational definitions of the various aspects of TP that may provide a common-interdisciplinary grounding of the concept of time. This analysis could possibly lead to new theories regarding TP, but most importantly will lead to the creation of a common-interdisciplinary taxonomy of time.

b) In-depth analysis of the existing methodologies used for measuring TP and development of a new model(s) for measuring TP.
c) Development of a prototypical tool for the assessment of generic/musical timing abilities that will monitor timing performance in human adults and children through personalized engaging and joyful activities (e.g., music games or music listening and performance activities).
d) Development of an online source for measurement standards and data exchange.
e) Evaluation of time standards in user interface design in Human-Computer Interaction application domains (e.g., air traffic control etc.).

WG2-A developmental view and analysis of individual and cultural factors on TP. Another issue in TP relates to performance differences within and between individuals and their underlying causes. TP is affected by cognitive development, developmental disorders, and brain damage; yet, none of this can explain the TP variability observed in normal participants. An exploration of the developmental changes of TP in children and elderly, along with the study of the interaction of TP and attention and memory, should enable us to answer some questions pertaining to this TP variability observed.
Expected outcomes:

a) In-depth analysis and review of the biological/cognitive factors promoting TP differences within and across individuals.
b) Development of strategies in comparing TP developmentally (including the definition of the methodology/stimuli parameters to be used).
c) In-depth analysis of time metaphors in language and gesture cross-culturally.
d) A conceptual analysis of static versus dynamic ideas of time based on temporal logic.
e) Development of TP questionnaires, adapted for different age groups and cultures, thus allowing for cross-cultural comparisons and other large epidemiological studies.
f) Development of a linguistic database with multicultural time expressions by studying existing representations of temporal/eventual information (e.g., TimeML).
g) Development of a knowledge based system able to recognize temporal expressions; it will be especially focused on the monitoring of opinions through time (i.e., how people change their opinions through time).There is need to build a knowledge-based system that recognizes temporal expressions and that can be easily extended to other languages. It could be applied in the automatic detection of temporal expressions in texts born with the Web 2.0 (where people write whatever is on their mind about a wide range of topics). Such texts are extremely relevant and a precious source of information. As a consequence, they could be considered a precious source of information for companies, political parties, but also for educational institutions.

WG3-TP of complex, multisensory events. To investigate TP under more realistic conditions, we must move away from the study of low-informational content stimuli toward the use of more ecologically-valid stimuli. Recently, a number of researchers have made this move, but some challenges persist: a) the quality of the stimuli is frequently

questioned; b) musical research is still lagging, thus limiting valuable comparisons with speech and action research; c) neuroimaging of complex stimuli is challenging due to the nature of the stimuli and each technique's limitations; d) research outcomes have not been systematically used for application development (e.g., reading impairment detection).

Expected outcomes:

a) In-depth analysis and review of the problems associated with complex stimulus use in TP.
b) Development of standardized methodology/analysis for measuring TP for complex stimuli.
c) Definition of strategies for using current/future results for the development of real-world applications.
d) Development of standardized methodology for generating complex stimuli and system requirements for time-controlled stimulus presentation.
e) Development of a stimulus database. This database will include speech, action, gesture, and musical stimuli.

WG4-TP in mental health, developmental disorders, and neurology.

Expected outcomes:

a) An extensive review of the current state-of-the-art in neuroimaging and definition of the techniques (or fusion of those) appropriate for TP.
b) In depth analysis and review of the proposed links between TP and well-known neural networks underlying attention, memory, language, space perception and action. We will take advantage of animal models for investigating the aspects that cannot be addressed in human participants.
c) In-depth analysis and review of time distortions in various mental and developmental disorders and specific brain-injuries.
d) Development of neurorehabilitation techniques and standardized TP tasks for inclusion in diagnostic neuropsychological batteries.

E. ORGANISATION

E.1 Coordination and organisation

This Action will be coordinated by a Management Committee (MC) and the tasks will be implemented by four WGs. These four WGs coincide with the following tasks as described previously:

- **WG1**: "Conceptual analysis and methodology for measuring TP", with the aims and content outlined in section D.2. This WG will have two subgroups (WG1a and WG1b), one focusing on the definitional aspect and the other on the methodological aspect of TP.
- **WG2**: "A developmental view and analysis of individual and cultural factors on TP" (see Section D.2). This WG will have two subgroups: WG2a focusing on the cognitive aspects and WG2b on the linguistic aspect of TP.
- **WG3**: "TP of complex, multisensory events" (see section D.2).
- **WG4**: "TP in mental health, developmental disorders, and neurology" (see section D.2). This WG will have two subgroups: WG4a focusing on the human TP and WG4b on the animal TP.

The essence of this Action is its multidisciplinary character; thus placing the dissemination of information (within and across WGs) a priority. Additionally, the four WGs are not mutually exclusive but interrelated. Hence, WG members will be involved in more than one WG. Finally, in the spirit of COST, the network is open to any interested party over its duration.

A MC will be formed and act according to COST Rules and Procedures. It includes a secretary, Vice-Chair and Chair, all elected in the Action's Kick-off Meeting. The latter two individuals preside over the MC and oversee the work of the four WGs, each of which is managed by a Coordinator and Co-coordinator (also elected). The MC will normally have two meetings per year, in conjunction with the meetings of the WGs. The relatively large size of the consortium reflects the fact that TP is important for most European and international countries and that many existing efforts need to be coordinated. Given the size of the Action, there is a strong need for an effective and efficient management structure. Hence, along with the Chair, Vice-Chair, and Secretary of the MC committee, we identify two additional roles in the MC, that of the Scientific Coordinator (SC) and Dissemination Coordinator (DC). The individuals that assume these roles will be elected in the Action's Kick-off Meeting.

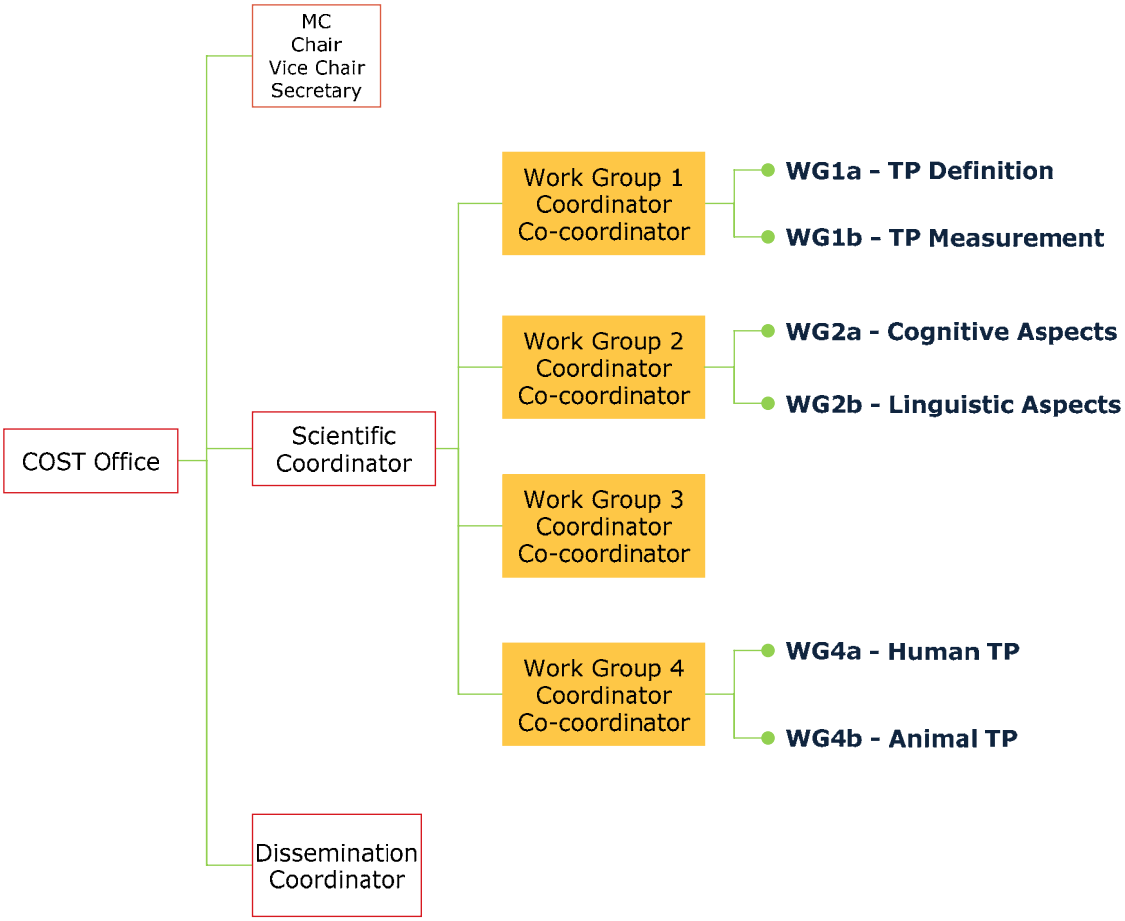

Figure 1.The Action's organizational structure.

The responsibilities of some of the roles are specified as follows:

Scientific Coordinator (SC)	• implementation of a common infrastructure of the Action's materials/work • direction of work to each WG Coordinator • advice on research topics based on the Technical Annex of the MoU • design of the scientific/technical programmes for the Workshops with the collaboration of the WG Coordinators • coordinate, along with the DC, the publication of a series of books/proceedings resulting from the Workshops/Conferences • keep an overview of the scientific activities of the Action and identify any need for improvement/discussion in the MC Meetings • coordinate, along with the WG Coordinator, the STMSs
Dissemination Coordinator (DC)	• form a sub-group of MC members who have experience in dissemination • design and production of the dissemination materials • coordinate the promotional activities for the Workshops/Conferences to ensure broad participation • liaison with key industrial and educational partners • maintain an updated list of target audiences and inform them on the Action's activities

	• keep an overview of the dissemination activities of the Action and identify any needs for improvement/discussion in MC Meetings • research for future funding or other opportunities for the junior/senior scientists of the Action
WG Coordinator & Co-coordinator	• organize and chair WG Meetings, prepare agenda, and meeting minutes • coordinate and review scientific/technical work • ensure continuous/efficient communication within and across WGs • communicate regularly with SC/DC on the WGs progress
Regular Action Members	• participate in WG Meetings and in research/dissemination activities • support the respective work of the WG Coordinators/Co-coordinators/SC/DC • contribute to Annual Progress Reports and Final Report • coordinate the STMSs at the institutional level

E.2 Working Groups

Each of the WGs focuses on particular aspects of the overall project (see Section D.2) and will be managed by a WG Coordinator and Co-coordinator (see Section E.1).

WG1-*Objective*: The general objective of WG1 is to critically examine the current definitions and measurements methods associated with TP.
WG2-*Objective*: The general objective of WG2 is to critically examine the links between time and memory, attention, language, development, and culture.
WG3- *Objective*: The general objective of WG3 is to critically examine the appropriate path of utilizing complex stimuli in TP research.
WG4-*Objective*: The general objective of WG4 is to critically examine the research on the neural correlates of TP and develop theories of how TP is represented in the brain and possible methodologies for neurorehabilitation.

The expected outcomes are listed in the Table below:

Task Name	*Responsible Workgroups*
Conceptual analysis of time	
Review of terminology and definitions in TP research	WG 1a
Analysis & review of TP in different stages of development	WG 2a
Analysis of static vs. dynamic ideas of time	WG 1a, WG 2b
Analysis of time metaphors in language & gesture cross-culturally	WG 1a, WG 2b
Analysis & review of problems associated with multisensory TP	WG 3, WG 4a
Analysis & review of current neuroimaging findings	WG 4a, WG 4b
Analysis & review of the proposed links between TP and neural networks underlying attention, memory, language e.t.c.	WG 2a, WG 4a, WG 4b
Analysis & review of studies on animal TP	WG 4b
Creation of a common-interdisciplinary taxonomy of concepts	All WGs
Build further knowledge on distortions of TP in neurological and mental disorders	
Review distortions of TP in various mental, developmental disorders, and other impairments	WG 2a, WG 4a
Develop methodology for measuring TP	
Analysis of the existing psychophysical/behavioral methodologies	WG 1b, WG 3
Methodological considerations associated with complex stimulus use in TP	WG 1b, WG 3, WG 4a
Methodological considerations in designing developmental studies of TP	WG 1b, WG 2a, WG 3, WG 4a
Methodological considerations in designing studies of TP in patient populations	WG 1b, WG 3, WG 4a
Review of neuroimaging techniques appropriate for TP	WG 4a, WG 4b
Define new time standards in the domain of human-computer interaction	WG 1b, WG 3
Create new reserch materials and tools	
Define and publish standards for making quality mesurements of TP	WG 1b, WG 3, WG 4a, WG 4b
Development of data acquisition and analysis tools for the assessment of timing abilities	WG 1b, WG 3
Development of a knowledge-based system for temporal expressions recognition	WG2b
Development of a collection of experimental stimuli (speech, action, gesture, musical stimuli)	WG 1b, WG 3, WG 2a, WG 2b
Development of an online source for experimental data exchange	All WGs
Development of standardized tests of TP for neuropsychological batteries	WG 1b, WG 2a, WG 3, WG 4a
Development of new neurorehabilitation techniques	WG 4a
Dissemination of information and training opportunities for young researchers	
Development of a web portal	All WGs
Database of interdiscilinary taxonomy of concepts	All WGs
Database of time-related expressions in various languages	All WGs
Mesurement standards	All WGs
Collection of tools for the analysis of experimental data	All WGs
Publications, conferences, workshops, training schools	All WGs

Milestones

While the success of the Action will be marked by the completion of the expected outcomes mentioned above, some of the major milestones will be:

1. Reports/publications from the Workshops/Conferences [Year 1-4]
2. Establishment of a common interdisciplinary taxonomy of TP concepts [Year 4]
3. Establishment of a complex stimuli collection [Year 4]
4. Establishment of data analysis acquisition and tool for assessing TP [Year 4].

E.3 Liaison and interaction with other research programmes

COST Actions: Working liaison with other new COST Actions will, in general, be achieved through consultation with COST. For COST Actions already established, this Action will actively seek liaison when appropriate. For example, we will actively seek collaboration with COST Action BM0605: Consciousness: A Transdisciplinary, Integrated Approach. The objective of this BM0605 Action is to advance the understanding of the mechanisms associated with consciousness.

Other Programmes: To ensure that all potential synergies can be exploited, this Action will actively seek opportunities to collaborate with the existing and new European agencies, initiatives, or programmes, which are working on issues related to TP or have links to TP. Specifically, this Action will actively seek collaboration with: **a)** Space, Time and Numbers in the Brain (STANIB): ERC Ideas. A project that aims to establish in Pisa, Italy an EU Centre of Excellence dedicated to frontier, interdisciplinary research of human perception, synergizing existing research efforts in Italy. The Principal Investigator of this project is a partner of TIMELY, thus collaboration is already in place; **b)** Helping Autism-diagnosed teenagers Navigating and Developing Socially (HANDS). An EU project that aims to improve the quality of life for teenagers with an autism diagnosis. The Coordinator of this project is a partner of TIMELY, thus collaboration is already in place. Establishing such collaborations is fundamental for the creation and continuation of a unique network on TP and will be representative of the success of this Action.

E.4 Gender balance and involvement of early-stage researchers

This COST Action will respect an appropriate gender balance in all its activities and the MC will place this as a standard item on all its MC agendas. The Action will also be committed to considerably involve early-stage researchers. This item will also be placed as a standard item on all MC agendas. This Action is actively planning to include early-stage researchers in most of its activities. The Action's main objective is to create the first community on TP in the EU and this cannot be envisioned without liaison with early-stage researchers. In addition, this Action is proposed by an early-stage researcher, thus inherently targeting new researchers on TP.

F. TIMETABLE

The duration of the Action is four years. Refer to Figure 2 for an indication of the distribution of the Action's activities over its duration.

- *MC meetings:* Eight MC meetings are distributed over the four years of the Action. One of the meetings organized each year is independent of other activities, whereas the second takes place immediately before another COST activity.
- *WG Meetings*: Four meetings are distributed for the WGs: one per year. On Year 1 and 3, four WG meetings are organized independently of each other, at times and locations chosen by the WG Coordinators/Co-coordinators after consultation with the MC. This organisation makes it possible to organize such meetings in conjunction with other events. On Year 2 and 4, the four WGs meet together immediately prior to an open access Conference.
- *Bi-Annual Training Schools and Workshops*: Two Training Schools will be organized on Year 1 and 3. These are designed in such a way that senior and junior scientists meet and interact. Three open access workshops will be organized in conjunction with international scientific conferences.
- *Bi-Annual Conferences*: Two open access conferences will be organized on Year 2 and 4. These meetings occur immediately after a WG joint meeting. International experts whose research is relevant to the Action are invited.
- *STSMs*: Throughout the Action, STSMs are set-up whenever possible and relevant, both within and between WGs. At least four STSMs per year will take place to ensure the Action's success.
- *Kick-Off Meeting and Final Meeting*: The first MC Meeting constitutes the Kick-Off Meeting and it is important for the Action's organization. The Final Meeting that includes a MC Meeting, a joint WG Meeting, and a Conference, provide the opportunity to evaluate the Action and to draft the Final Report.

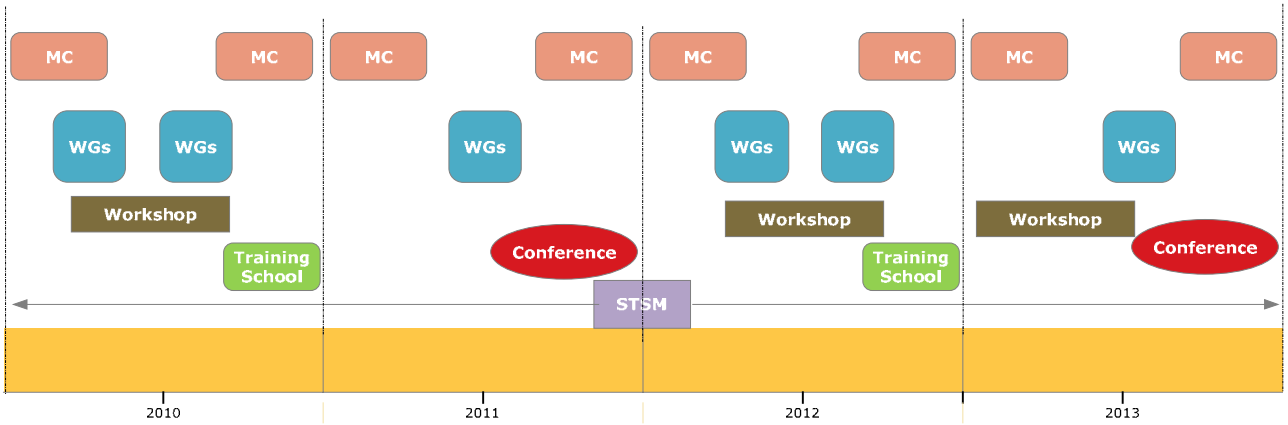

Figure 2. The Action's activities over the period of four years.

Deliverables

A draft for a list of deliverables, which is, however, subjected to revision, is shown below:

WG1
1. Report on the interdisciplinary conceptual analysis of time
2. Development of the structure of a common-interdisciplinary taxonomy of time
3. Report on the existing methodologies used in TP and proposed measurement model(s)
4. Development of a prototypical tool for the assessment of generic/musical timing abilities that will monitor timing performance in human adults and children
5. Development of an online source for measurement standards and data exchange
6. Report on the evaluation of time standards in user interface design in Human-Computer Interaction application domains

WG2
1. Report on the biological/cognitive factors promoting TP individual differences
2. Development of a proposal on strategies for comparing TP developmentally
3. Development of attentional computational model/algorithm for detection of salient events
4. Report on the different representations of time in language and gesture
5. Development of a linguistic database with multicultural time expressions and a knowledge-based system that recognizes temporal expression in multiple languages, combined with a system which recognizes temporal expressions using machine learning techniques
6. Development of TP questionnaires, adapted for different age groups and cultures

WG3
1. Report on the problems associated with complex stimulus use in TP
2. Proposal for a standardized methodology/analysis for measuring TP of complex stimuli
3. Development of a proposal for strategies for using current/future results for the development of real-world applications
4. Proposal for a standardized methodology for generating complex stimuli and system requirements for time-controlled stimulus presentation
5. Development of a stimulus collection

WG4
1. Report on the current state-of-the-art in neuroimaging and definition of the techniques (or fusion of those) appropriate for TP
2. Report on time distortions in various mental and developmental disorders and specific brain-injuries
3. Report on the development of neurorehabilitation techniques and standardized TP tasks for inclusion in diagnostic neuropsychological batteries

G. ECONOMIC DIMENSION

The following 17 COST countries and cooperative states have actively participated in the preparation of the Action or otherwise indicated their interest: CH, DE, DK, EE, ES, FI, FR, GR, IE, IT, IL, LT, NL, PL, PT, SE, UK.

On the basis of national estimates, the economic dimension of the activities to be carried out under the Action has been estimated at 12 Million € for the total duration of the Action.

This estimate is valid under the assumption that all the countries mentioned above but no other countries will participate in the Action. Any departure from this will change the total cost accordingly.

Outside the economic dimension calculated here, the following non-EU Institutions expressed their interest in joining the Action: Department of Psychology, Université Laval (CA), Department of Psychology and Neuroscience, Duke University (USA), MARCS Auditory Laboratories University of Western Sydney-Bankstown (AU), Department of Neurobiology and Psychology, University of California, Los Angeles (USA), Department of Psychology, Florida Atlantic University (USA), Department of Neuroscience, Baylor College of Medicine (USA), Department of Psychology, Queens College (USA), Department of Psychology, Peking University (CN), Department of Computational Intelligence and Systems Science, Tokyo Institute of Technology (JP). Given that this Action aims to establish the first European community on TP it will be necessary to collaborate with international partners and gain knowledge and expertise from them. The international institutions mentioned above are leaders in different aspects of TP and their participation is considered essential.

H. DISSEMINATION PLAN

H.1 Who?

A number of target groups have been identified as the key recipients of the information of this Action, including its ongoing development, activities, events, and research findings:

- Researchers in different fields and mental and medical health professionals
- Academic researchers and educators, other research networks, and the general public
- Multimedia industries and representatives from standardization bodies
- Young researchers aiming at interdisciplinary research and practice
- Software and psychophysical/imaging measuring tools engineers

H.2 What?

Several initiatives are to be launched so as to disseminate the collective expertise of the network and a number of traditional and electronic media have been identified as the dissemination tools.

- **Organization of Meetings, Workshops, Training Schools:** As outlined in Section F, Conferences, Workshops, and Training Schools are to be organized in conjunction with other large meetings during the Action. The open access meetings will involve most of the participants of the Action as well as other interested researchers and invited speakers whose work is relevant to the Action's research programme. By holding such meetings in conjunction with other networks or events will greatly promote the visibility of this Action. The Training Schools will allow for early stage researchers to become actively involved in the Action and participate in STSMs. Additionally, they will serve as an opportunity of disseminating results generated by the Action to other networks and scientists.
- **Web site:** A freely accessible web site will be established and maintained from the beginning of the Action to provide easy access to information about the activities and results of the Action to a wide audience from academia, industry, and the general public. The web site will also include relevant to the Action information on: events, funding, post-doctoral and doctoral positions, and new publications.
- **Digital Repository, Mailing Lists, and Social Software:** A password-controlled digital repository accessible only to the members of this COST Action will be set up to share documents and support co-authoring of scientific publications. In addition, mailing lists will be established to enable fast communication of the information among the members of the Action. Finally, social software such as blogs will be deployed as well.
- **Scientific Publications:** The results obtained through this COST Action will be presented in the form of contributions in peer-refereed scientific journals and workshop and conference proceedings, books, white papers, technical reports, and press releases.

H.3 How?

The Action aims to disseminate its activities to the scientific community, general public, and industry. Various dissemination activities are planned in order to increase the visibility of the Action and the work generated from this Action. During the Action's duration, new ways of dissemination will be continuously explored.

An initial dissemination plan goes as follows:

- Publishing the work generated during the Action in journals and planning to create a book on all the Action's results.
- Presentation of Action's findings in national and international conferences in the form of talks, posters, round table discussions etc.
- Circulation of reports and deliverables to all the partners of the Action.
- Organizing the open access meetings in conjunction with other scientific events.
- Continuous updating of the website and social software to ensure increased visibility and interest.

Part II – Additional Information

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D. RECENT PUBLICATIONS

(a) Selected recent publications of the Proposer

Vatakis, A., & Spence, C. (in press). Audiovisual temporal integration for complex speech, object-action, animal call, and musical stimuli. In M. J. Naumer & J. Kaiser (Eds.), *Multisensory Object Perception in the Primate Brain*. Springer.

Vatakis, A., Ghazanfar, A. A., & Spence, C. (2008). Facilitation of multisensory integration by the "unity effect" reveals that speech is special. Journal of Vision, 8(9):14, 1-11.

Vatakis, A., & Spence, C. (2008). Investigating the effects of inversion on configural processing using an audiovisual temporal order judgment task. Perception, 37, 143-160.

Vatakis, A., Navarra, J., Soto-Faraco, S., & Spence, C. (2008). Audiovisual temporal adaptation of speech: Temporal order versus simultaneity judgments. Experimental Brain Research, 185, 521-529.

Vatakis, A., & Spence, C. (2008). Evaluating the influence of the 'unity assumption' on the temporal perception of realistic audiovisual stimuli. Acta Psychologica, 127, 12-23.

Vatakis, A., & Spence, C. (2007). How 'special' is the human face? Evidence from an audiovisual temporal order judgment task. Neuroreport, 18, 1807-1811.

Vatakis, A., & Spence, C. (2007). Crossmodal binding: Evaluating the 'unity assumption' using audiovisual speech stimuli. Perception & Psychophysics, 69, 744-756.

Vatakis, A., Navarra, J., Soto-Faraco, S., & Spence, C. (2007). Temporal recalibration during asynchronous audiovisual speech perception. Experimental Brain Research, 181, 173-181.

Vatakis, A., Bayliss, L., Zampini, M., & Spence, C. (2007). The influence of synchronous audiovisual distractors on audiovisual temporal order judgments. Perception & Psychophysics, 69, 298-309.

Vatakis, A., & Spence, C. (2006). Temporal order judgments for audiovisual targets embedded in unimodal and bimodal distractor streams. Neuroscience Letters, 408, 5-9.

Vatakis, A., & Spence, C. (2006). Audiovisual synchrony perception for music, speech, and object actions. Brain Research, 1111, 134-142.

Vatakis, A., & Spence, C. (2006). Evaluating the influence of frame rate on the temporal aspects of audiovisual speech perception. Neuroscience Letters, 405, 132-136.

Vatakis, A., & Spence, C. (2006). Audiovisual synchrony perception for speech and music using a temporal order judgment task. Neuroscience Letters, 393, 40-44.

Krekelberg, B., **Vatakis**, A., & Kourtzi, Z. (2005). Implied motion from form in the human visual cortex. Journal of Neurophysiology, 94, 4373-4386.

Navarra, J., **Vatakis**, A., Zampini, M., Soto-Faraco, S., Humphreys, W., & Spence, C. (2005). Exposure to asynchronous audiovisual speech increases the temporal window for audiovisual integration of non-speech stimuli. Cognitive Brain Research, 25, 499-507.

(b) Selected recent publications of the TIMELY Partners

Actis Grosso, R., Zavagno, D. (2008). The representation of time courses in visual arts and the development of the concept of time in children. In Pinna, B. (Ed). Art and Perception. Towards a Visual Science of Art, Part 2, pp. 147-69. Leiden (Nl): Brill Academic Publisher.

Brannon, E. M., Libertus, M. E., **Meck**, W. H., & Woldorff, M. G. (2008). Electrophysiological measures of time processing in infant and adult brains: Weber's law holds. Journal of Cognitive Neuroscience, 20, 193-203.

Brown, B. L., Richer, P., & Doyere, V. (2007). Postcue effects on peak interval timing in rats. Behavioural Processes, 74, 300-10.

Bueti, D., & **Walsh**, V. (in press). The parietal cortex and the representation of time, space, number and other magnitudes. Philosophical Transactions of the Royal Society B.

Burr, D., Silva, O., Cicchini, G. M., Banks, M. S., & **Morrone**, M. C. (2009). Temporal mechanisms of multimodal binding. Proceedings of the Royal Society B, 276, 1761-69.

Busch, N. A., Groh-Bordin, C., Zimmer, H. D., & Herrmann, C. S. (2008). Modes of memory: Early electrophysiological markers of repetition suppression and recognition enhancement predict behavioral performance. Psychophysiology, 45, 25-35.

Combi, C., Degani, S., & **Jensen**, C. S. (2008). Capturing temporal constraints in temporal ER models. Proceedings of the 27th International Conference on Conceptual Modeling, Barcelona, Spain, pp. 397-411, October 20-23.

Cummins, F. (2009). Rhythm as entrainment: The case of synchronous speech. Journal of Phonetics. 37, 16-28.

Dalla Bella, S., Gigučre, J-F., & Peretz, I. (2007). Singing proficiency in the general population. JASA, 121, 1182-89.

Delevoye-Turrell, Y., **Giersch**, A., Wing, A., & Danion, J. M. (2007). Fluency deficits in the sequencing of motor actions in patients with schizophrenia. Journal of Abnormal Psychology, 116, 56-64.

Dellatolas, G., Watier, L., Lubart, T., Chevrie-Muller, C. (in press). Rhythm reproduction in Kindergarten, reading performance at second grade, and developmental dyslexia theories. Archives of Clinical Neuropsychology.

Droit-Volet, S., & Gil, S. (2009). The time-emotion paradox. Journal of Philosophical Transactions of the Royal Society, B: Biological Sciences, 364, 1943-53.

Eagleman, D. M. (2008). Human time perception and its illusions. Current Opinion in Neurobiology, 18, 131-6.

Eisler, A. D., Eisler, H., & Mori, S. (2007). Cognitive impairment and subjective time in Japanese schizophrenics and nonschizophrenics. In S. Mori, Miyaoka, T., & Wong, W. (Eds.), Fechner Day 2007 (pp. 245-250). Proceedings of the 23rd Annual Meeting of the International Society for Psychophysics. Tokyo: The International Society for Psychophysics.

Elliott, M. A., Shi, Z., & Kelly, S. D. (2006). A moment to reflect upon perceptual synchrony. Journal of Cognitive Neuroscience, 18, 1880-83.

Falter, C., **Noreika**, V., **Kiverstein**, J., & **Mölder**, B. (2009). Concrete magnitudes: From numbers to time. Commentary on Cohen Kadosh's & Walsh's "Numerical representation in the parietal lobes: abstract or not abstract?" Behavioral and Brain Sciences.

Giersch, A., Lalanne, L., Corves, C., Seubert, J., Zhuanghua, S., Foucher, J., & **Elliott**, M. A. (in press). Extended visual simultaneity thresholds in patients with schizophrenia. Schizophrenia Bulletin.

Glicksohn, J., & Lipperman-Kreda, S. (2007). Time, thought, and consciousness. The Journal of Mind and Behavior, 28, 289-305.

Grondin, S. (2008) (Ed.). Psychology of time. Bingley, UK: Emerald Group Publishing.
Honing, H., & Ladinig, O. (2009). Exposure influences expressive timing judgments in music. Journal of Experimental Psychology: Human Perception and Performance, 35, 281-88.
Ishihara, M., **Keller**, P. E., Rossetti, Y., & Prinz, W. (2008). Horizontal spatial representations of time: Evidence for the STEARC effect. Cortex, 44, 454-61.
Jones, L. A., Poliakoff, E., & Wells, J. (in press). Good vibrations: Human interval timing in the vibrotactile modality. The Quarterly Journal of Experimental Psychology.
Johnston, A., Bruno, A., Watanabe, J., Quansah, B., Patel, N., Dakin, S. & Nishida, S. (2008). Visually-based temporal distortion in dyslexia. Vision Research, 48, 1852-58.
Johnson, C. W. (2009). Information Management for Mobile Communications in the European Floods of 2007. In J. Leffler and M. Klann (Eds.), Mobile Response. Lecture Notes in Computing Science, 5424, pp. 1-11. Springer Verlag
Karmarkar, U. R., & **Buonomano**, D. V. (2007). Timing in the absence of clocks: Encoding time in neural network states. Neuron, 53, 427-38.
Klapproth, F. (2008). Time and decision making in humans. Cognitive, Affective, and Behavioral Neuroscience, 8, 509-24.
Keller, P.E., Knoblich, G., & Repp, B.H. (2007). Pianists duet better when they play with themselves: On the possible role of action simulation in synchronization. Consciousness & Cognition, 16, 102-11.
Kołodziejczyk, I., & **Szeląg** E. (2008). Auditory perception of temporal order in centenarians in comparison with young and elderly subjects. Acta Neurobiologiae Experimentalis, 68, 373-81.
Lebrun-Guillaud, G., & **Tillmann**, B. (2007). Influence of a tone's tonal function on temporal change detection. Perception & Psychophysics, 69, 1450-59.
Lewkowicz, D. J. (in press). Infant perception of audio-visual speech synchrony. Developmental Psychology.
Machado, A., & Arantes, J. (2006). Further tests of the scalar expectancy theory (SET) and the Learning to time (LeT) model in a temporal bisection task. Behavioural Processes, 72, 195-206.
McColgan, K. L., & **McCormack**, T. (2008). Searching and planning: Young children's reasoning about past and future event sequences. Child Development, 79, 1477-97.
Meck, W. H., Penney, T. B., & Pouthas, V. (2008). Cortico-striatal representation of time in animals and humans. Current Opinion in Neurobiology, 18, 145-152.
Mölder, B. (2008) Normativity and deflationary theories of truth. Studia Philosophica Estonica, 12, 179-193.
Morrone, C., Ross, J., & **Burr**, D. (2005). Saccades cause compression of time as well as space. Nature Neuroscience, 8, 950-54.
Navarra, J., Hartcher-O'Brien, J., Piazza, E., & **Spence**, C. (in press). Adaptation to audiovisual asynchrony modulates the speeded detection of sound. PNAS USA.
Navarre, D., **Palanque**, P., Dragicevic, P., & Bastide, R. (2006). An approach integrating two complementary model-based environments for the construction of multimodal interactive applications. Interacting with Computers, 18, 910-41.
Noesselt, T., Rieger, J. W., Schoenfeld, M. A., Kanowski, M., Hinrichs, H., Heinze, H. J., Driver, J. (2007). Audiovisual temporal correspondence modulates human multisensory

superior temporal sulcus plus primary sensory cortices. Journal of Neuroscience, 27, 11431-41.

Obleser, J., Eisner, F., & **Kotz**, S.A. (2008). Bilateral speech comprehension reflects differential sensitivity to spectral and temporal features. Journal of Neuroscience, 28, 8116-23.

Øhrstrøm, P., & Hasle, F. V. (2008). Time in Philosophical Logic. In C. S. Jensen & R. T. Snodgrass (eds), Temporal database entries for the springer encyclopedia of database systems. Aalborg: s.287-292 (TIME CENTER Technical Report).

Papadelis, G. & Papanikolaou, G. (2004). The Perceptual Space Between and Within Musical Rhythm Categories. In: Davidson, J. (ed.). The Music Practitioner: Research for the Music Performer, Teacher and Listener (pp. 117-129). Aldershot: Ashgate Publishing Ltd.

Prokopidis, P., Desypri, E., Papageorgiou, H., & Markopoulos, G. (2009). TimeEL: Recognition of Temporal Expressions in Greek texts. 9th International Conference on Greek Linguistics, Chicago, October 2009.

Rubia, K., Halari, R., Christakou, A., & Taylor, E. (in press) Impulsiveness as a timing deficit: brain dysfunctions during timing in Attention Deficit Hyperactivity Disorder and normalisation with Methylphenidate. Philosophical Transactions of the Royal Society B.

Saquete, E., Ferrández, O., Ferrández, S., Martínez-Barco, P., & **Muñoz**, R. (2008). Combining automatic acquisition of knowledge with machine learning approaches for multilingual temporal recognition and normalization. Information Sciences, 178, 3319-32.

Schimmel, O., van de Par, S., Breebaart, J., & **Kohlrausch**, A. (2008). Sound segregation based on temporal envelope structure and binaural cues. JASA, 124, 1130-45.

Sevelinges, Y., Moriceau, S., Holman, P., Miner, C., Muzny, K., Gervais, R., **Mouly**, A. M., & Sullivan, R. M. (2007). Enduring effects of infant memories: infant odor-shock conditioning attenuates amygdala activity and adult fear learning. Biological Psychiatry, 62, 1070-79.

Stevens, C., Schubert, E., Wang, S., Kroos, C., & Halovic, S. (2009). Moving with and without music: scaling and lapsing in time in the performance of contemporary dance. Music Perception Special Issue, 26, 451-64.

Szymaszek, M. S., **Pöppel**, E., & **Szelag**, E. (2009). Individual differences in the perception of temporal order: the effect of age and cognition. Cognitive Neuropsychology, 26, 135-47.

Taatgen, N. A., **Van Rijn**, H., & Anderson, J. R. (2007). An integrated theory of prospective time interval estimation: The role of cognition, attention and learning. Psychological Review, 114, 577-98.

Ulrich, R., & Miller, J. (2008). Response grouping in the psychological refractory period (PRP) paradigm: Models and contamination effects. Cognitive Psychology, 57, 75-121.

van der Burg, E., Olivers, C. N. L., Bronkhorst, A. W., & **Theeuwes**, J. (2008). Audiovisual events capture attention: Evidence from temporal order judgments. Journal of Vision, 8, 1-10.

van Wassenhove, V. (2009). Minding time in an amodal representational space. Philosophical Transactions of the Royal Society of London B: Biological Sciences, 364, 1815-30.

Wackermann, J. (2008). Measure of time: a meeting point of psychophysics and fundamental physics. Mind and Matter, 6, 9-50.
Wearden, J. H., & Lejeune, H. (2008). Scalar properties in human timing: conformity and violations. Quarterly Journal of Experimental Psychology, 61, 569-87.
Whitaker, D., Levi, D. M., & Kennedy, G. J. (2008). Integration across time determines path deviation discrimination for moving objects. PLoS ONE, 3, e1930.
Wittmann, M. (2009). The inner sense of time. Philosophical Transactions of the Royal Society B: Biological Sciences, 364, 1955-1967.
Zakay, D. (2009). Illusions of Time. In: Birx, J.H. (Ed.). Encyclopedia of Time. Sage publications.
Zampini, M., Shore, D. I., & **Spence**, C. (2003), Audiovisual temporal order judgments. Experimental Brain Research, 152, 198-210.

(c) Selected running projects of TIMELY Partners

Dr. Anne Giersch - EU Project: *Impaired Event-Structure Coding in Schizophrenia*.
Dr. Mark A. Elliott - DFG Grant EL 248/4-1: *Perceptual and process synchrony: An examination of the dynamic interface linking conscious and subconscious visual processes.*
Dr. Spiros Skiadopoulos -TMR (training and mobility of researchers): *Chorochronos* (http://www.dblab.ece.ntua. gr/~choros/).
Dr. Valérie Doyère- EU-FP6 Integrated project 2005-2009: *PROMEMORIA*
Prof. Rafael Muñoz - FP6-ICT: *Question Answering Learning technologies in a multiLingual and Multimodal Environment*.
Drs: Niko Busch, Valtteri Arstila, Christine Falter, Bruno Mölder, Julian Kiverstein, Valdas Noreika - European Platform for Life Sciences, Mind Sciences and the Humanities by the German Volkswagen Stiftung: *Subjective time - phenomenological property or cognitive construct?*
Prof. Chris W. Johnson - EC project A9219 Tender JLS/2008/D1/018: *A Study on Measures to Analyse and Improve European Emergency Preparedness in the Field of Fixed and Mobile Telecommunications and Internet.*
Dr. Fred Cummins - Science Foundation, Ireland: *CHAINS: CHAracterising INdividual Speakers.*
Dr. Christine Falter - Baily Thomas Charitable Trust: *Temporal Characteristics of Perception in Autism Spectrum Disorders.*
Dr: Barbara Tillmann, S. Dalla Bella, D. Schoen, S. Kotz, P. Keller - Marie Curie Initial Training Networks (ITN) 2009: EBRAMUS Europe, *BRAin and MUSic-New perspectives for stimulating cognitive and sensory processes.*
Prof. Catherine Stevens - Australian Research Council 2008: *Expecting the Unexpected: Learning Complex Temporal and Rhythmic Relations.*
Dr. Peter Keller - Polish Ministry of Science & Higher Education: *Timing in Group Action.*
Prof. Elżbieta Szeląg - Ministry of Science and Education in Poland: *Neuroanatomical correlates of time perception.*

Prof. Palanque Philippe - Network of Excellence Framework VI: *ResIST, a Network of Excellence that integrates leading researchers active in the multidisciplinary domains of Dependability, Security, and Human Factors.*

Prof. Henkjan Honing - EU FP6-IST: *Emergent cognition through active perception (EmCAP).*

Dr. Masami Ishihara - DFG (Deutsche Forschungsgemeinschaft): *Spatial representation of time during motor preparatory information processing in humans*.

Dr. Teresa McCormack - Economic and Social Research Council, UK: *Time and interventions in children's causal structure learning.*

Prof. Simone Dalla Bella - International Reintegration Grant (IRG), 6th Network Program of the European Commission: *Functional and neuronal underpinnings of synchronization to auditory stimuli.*

Prof. Armando Machado - Foundation for Science and Technology: *Animal Cognition: Time and Number*.

Prof. David Burr - ERC Ideas: *Space, Time and Numbers in the Brain (STANIB).*

Dr. Toemme Noesselt - DFG-SFB-TR31/TPA8: *Neural Basis of audiovisual integration*.

Prof. Maria Concetta Morrone - PF6. Nest: *MEMORY*.

Prof. Peter Øhrstrøm - EU-project: *HANDS* (http://hands-project.eu/).

Dr. Marc Wittmann - National Institute of Health NIH/NIDA: *Time processing in stimulant users: Impulsivity and temporal discounting.*

Prof. Simon Grondin - Natural Sciences and Engineering Research Council of Canada (Discovery Grant): *From sensation to cognition: The case of time perception.*

Dr. Jordi Navarra - Ministerio de Ciencia e Innovación: *Perceptual Mechanisms of temporal recalibration.*

Prof. Piotr Jaskowski - Initial Training Network: *Lateralized Attention Networks*

Prof. Rolf Ulrich - German Research Foundation (DFG UL 116/12-1): *Mechanisms of prospective time perception: Are these modality specific or amodal?*

Prof. David Whitaker - Wellcome Trust project grant: *Flexible Human Time Perception: sensory and sensorimotor consequences.*

Dr. Lucas Spierer - University of Lausanne, Switzerland, Interdisciplinary research grant: *Temporal processing as a biomarker for behavioral addiction.*

Dr. Jeremy Grivel - University of Lausanne, Switzerland, The Pierre Mercier Foundation for Science: *Neurorehabilitation of temporal processing impairments in addiction.*