

The findings of Armor and Sackett concerning predictability of actual and hypothetical events

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Abstract

The experiments of Armor and Sackett demonstrate that the reliability of future predictions for events is better for real than for hypothetical events. This strange finding, if real, would be an anomaly analogous to Libet's findings about active aspects of consciousness challenging the notion of free will.

In this article it is argued that it is difficult to explain the finding in the physicalistic framework, and that the allowance of free will seems only to worsen the situation since precognition of acts of free will does not make sense. In the framework of Topological Geometrodynamics (TGD) zero energy ontology (ZEO) replaces the standard ontology of quantum theory. ZEO predicts that in "big" (ordinary) state function reductions (BSFRs) the arrow of time changes and that the identification of acts of free will identified as BSFRs is not in conflict with the determinism of classical physics as an exact part of quantum TGD. Also Libet's findings can be understood.

This suggests a model for the anomaly. The experiment would have already happened as BSFR ("already" is with respect to subjective time to be distinguished from geometric time) for a quantum system associated with the experimenters and participants. The knowledge that the event is actual inspires unconsciously the attempt to "remember" the personal performance in the experiment instead of only imagining it and this would explain the improved future predictions.

Contents

1	Introduction	2
2	Why the standard physics based explanation for the findings of Armor and Sackett looks implausible?	3
3	What Zero energy ontology (ZEO) is?	4
4	Some implications of ZEO	5
5	ZEO based model for the findings of Armor and Sacker	6

1 Introduction

Past research in experimental psychology has brought evidence showing that certain changes in internal neurocognitive environments of human subjects can influence their predictions of near future events. In the series of experiments published in a recognized psychological Journal of Personality and Social Psychology, Armor and Sackett [J2] examined how the nature of future events influence the participants predictions about their future performance in different tasks.

In Study 1, half of participants were informed that they will complete a scavenger hunt task, i.e. finding particular objects at the university campus during 30 minutes, whereas the second half of participants were not informed. Thus, the expectations of participants were manipulated in terms of real versus hypothetical future events and this manipulation also causes different changes in internal neurocognitive environments in each half of participants. The participants were asked How well will you do on the scavenger hunt? or How well would you do, if you were asked to complete the scavenger hunt?. After that, all the participants completed the scavenger hunt task and their predictions were compared with their real performance in this task. Strikingly, participants who did expect to complete the task predicted their own performance quite accurately. In contrast, participants who believed that the task is only a hypothetical future event showed much higher prediction-performance discrepancy, i.e. they were not able to predict their future performance accurately.

These findings were replicated also in Study 2, where another kind of task was used (a completion of test used for Graduate Record Examination). One may ask how it is possible that participants that were informed about their future life event predicted their real performance in the task better than non-informed participants. The authors of this study were quite surprised by obtaining these results and labeled them as "seemingly anomalous findings". If this finding is real it provides a difficult challenge for model builders.

In the context of Minkowski spacetime, several possible explanations can be theoretically conceptualized:

1. In classical GRT, the causal structure is the structure of light cones of the space-time metrics. As the matter-energy degrees of freedom determine the metric through Einsteins equations, the causal structure of a region of space-time is dynamical: it depends on the state of the matter energy in its past light cone. If one identifies the causality of human actions experienced as acts of free will with the deterministic causality of field equations, the ability to predict the near future is theoretically possible. This applies also to person's own behavior if it does not involve free will : if this is the case, the two causalities cannot be identified.
2. Also a general quantal explanation may be considered. Quantum measurement provides information. In the context of the above-outlined experiments, the participants who were told about the purpose of the experiment gained information. Could this action have involved state function reduction of some kind improving the ability to predict their own future. Also this option would assume that HOs are passive inspectors of their own fate and does not conform with the direct experience of having (partially) free will.
3. One can consider also an explanation in terms of precognition based on future-to-past communications requiring change of the arrow of time and therefore also violation of standard thermodynamics. Precognition is classified as belonging to the field of parapsychology by materialists accepting only a single arrow of time. Also this explanation fails if one accepts free will: precognizing of own unpredictable acts of free will is impossible.

In the sequel the problems of various physicalistic explanations are discussed in more detail and the TGD based model relying on zero energy ontology (ZEO) [L5] replacing the standard ontology of quantum theory in TGD framework and solving the basic paradox of quantum measurement theory. The basic prediction is that the arrow of time changes in "big" (ordinary) states function reductions (BSFRs) but is preserved in "small" SSFRs as analogs of "weak" measurements. This forces to distinguish between geometric and subjective time.

This leads to an understanding of the findings of Libet [J3] about active aspects of consciousness challenging the reality free will: in BSFR the arrow of causality changes and the outcome of BSFR causes the neural activity rather than vice versa. Also the findings of Armor and Sackett

seem to give direct support for the physicalistic picture: the members of group A would be passive inspectors of their own future actions and therefore would have not free will. Precognition not accepted in the physicalistic framework is however required, which suggests that BSFRs transforming precognition to memory recall might be involved.

In the sequel the findings of Armor and Sackett are taken at face value and an explanation based on TGD inspired theory of consciousness relying on zero energy ontology (ZEO) allowing to get rid of the basic paradox of quantum measurement theory is proposed. There are 2 new elements essential for the explanation.

1. There is a hierarchy of magnetic bodies carrying dark matter as $h_{eff} = nh_0$ phases of ordinary matter and defining a self-hierarchy.
2. The time reversal in BSFRs makes memory recall in reversed time time direction possible: these memories need not be personal and it is possible to get information about the memories of MB at a higher level of hierarchy with a reversed arrow of time after BSFR.

In the scavenger hunt BSFR at higher level would be assignable to the experiment which had already occurred with respect to subjective time at a higher level of the hierarchy in the geometric future of participants. This BSFR would be followed by a cascade of BSFRs proceeding to shorter scales in subjective future but located in the geometric past.

The subject persons who were told that that they will participate a scavenger hunt would have received non-personal memories about those abstract aspects of the scavenger hunt at higher level of hierarchy, which they could not affect by BSFRs: the number of objects found by the participant would have been this kind of aspect and already determined by a BSFR at a higher level of hierarchy. Ordinary motor action would be very similar process involving communications to lower levels of self hierarchy in the geometric past.

This explanation is akin to the earlier proposal [L1] [K2] for an explanation of psychedelic experiences in which subject persons experience meeting representatives of advanced civilizations in outer space. The explanation relies on sending a signal, which is reflected back as a time reversed signal (involving BSFR): this allows to circumvent the barrier caused by finite speed of light. In principle this would make signalling with arbitrary distance civilizations possible.

2 Why the standard physics based explanation for the findings of Armor and Sackett looks implausible?

What seems clear to me is that it is very difficult to understand the findings of Armor and Sackett [J2] - if real - in the standard physics framework.

1. Standard physics excludes precognition: the thermo-dynamical arrow of time is fixed and the quantization procedure of quantum field theory fixes the arrow of time. Creation operators create states and annihilation operators destroy them. The change of arrow of time would change the roles of these operators. Classically this corresponds to the fact that signals propagate in preferred direction only. It is difficult to see how quantum effects according to standard QM could help. State function reductions happen in standard physics only in very short scales and have no effect in macroscales. They do not make possible effective precognition.
2. The idea that the persons in group A got bored after they had found the number of objects that they had estimated to find does not work since the same should have happened in group B but did not.
3. The experimenter effect is encountered in parapsychology experiments and also in experiments involving living subjects (testing of drugs). There are extremely successful parapsychology experimenters and often their findings cannot be replicated. Could the experimenters somehow affect the subject persons so that the outcome of the experiment is what the experimenter would regard as desired. Physicalists deny the possibility of this kind of effect so that fraud or bad experimentation remains the only explanation. The reality of Placebo effect

cannot be denied and suggests that the state of mind of the patient affects the healing in conflict with the physicalistic expectations. These effects are discussed from the TGD point of view in an article [K1] prepared in the project organized by Lian Sidoroff. Experimenter effect leads to ask whether the strong belief of experimenter on the expected result could induce the result also in the experiment of Armor and Sackett. This hypothesis could be tested by replicating the experiment sufficiently many times by other experimenters.

4. The causal reference frame model of Guerin and Bruckner [J2] involves a rather speculative proposal that classical GRT could allow anomalies in which the order of events is different for different observers modelled in terms of lightcones. One can ask whether it could differ in the recent experiments between participants a in group A and participants b in group B. For persons in group A it would have been changed and they could "remember" their performance whereas as participants in B only estimated it since they did not know that effective memory recall is possible! The information would have entered as classical signals in reversed time direction to the participants in group A. Somehow the information about the participation to the actual experiment would have made possible this effective change of arrow of time.

Classical Relativity predicts that gravitation is extremely weak interaction so that the explanation does not look plausible to me. There are however some black-hole like solutions of Einstein's equations known as Kerr-Newman metrics [B2] describing rotating objects having opposite arrows of time in near-field and far-field regions but these solutions do not seem relevant in the recent case.

It is difficult to see how standard quantum physics could help. One must however notice that there is no generally accepted quantum theory of gravitation.

3 What Zero energy ontology (ZEO) is?

The TGD based explanation would be based on zero energy ontology (ZEO) allowing to solve the basic paradox of quantum measurement theory. First a brief summary of ZEO [L5].

1. In ZEO quantum states are not 3-dimensional but superpositions of 4-dimensional deterministic time evolutions connecting ordinary initial 3-dimensional states. By holography they are equivalent to pairs of ordinary 3-D states identified as initial and final states of time evolution.

Quantum jumps replace this state with a new one: a superposition of deterministic time evolutions is replaced with a new superposition. Classical determinism of individual time evolution is not violated and this solves the basic paradox of quantum measurement theory. There are two kinds of quantum jumps: ordinary ("big") state function reductions (BSFRs) changing the arrow of time and "small" state function reductions (SSFRs) (weak measurements) preserving it and giving rise to the analog of Zeno effect [L5].

2. To avoid getting totally confused it is good to emphasize some aspects of ZEO.
 - (a) ZEO does not mean that physical states in the usual 3-D sense as snapshots of time evolution would have zero energy state pairs defining zero energy states as initial and final states have same conserved quantities such as energy. Conservation implies that one can adopt the conventions that the values of conserved quantities are opposite for these states so that their sum vanishes: one can think that incoming and outgoing particles come from geometric past and future is the picture used in quantum field theories.
 - (b) ZEO means two times: subjective time as sequence of quantum jumps and geometric time as space-time coordinate. These times are identifiable but are strongly correlated.
3. In BSFRs the arrow of time is changed and the time evolution in the final state occurs backwards with respect to the time of the external observer. BSFRs can occur in all scales since TGD predicts a hierarchy of effective Planck constants with arbitrarily large values. There is empirical support for BSFRs.

- (a) The findings of Mineev et al [L2] in atomic scale can be explained by the same mechanism [L2]. In BSFR a final zero energy state as a superposition of classical deterministic time evolutions emerges and for an observer with a standard arrow of time looks like a superposition of deterministic smooth time evolutions leading to the final state. Interestingly, once this evolution has started, it cannot be stopped unless one changes the stimulus signal inducing the evolution in which case the process does not lead to anywhere: the interpretation would be that BSFR back to the initial state occurs!
- (b) Libets' experiments about active aspects of consciousness [J3] can be understood. Subject person raises his finger and neural activity starts before the conscious decision to do so. In the physicalistic framework it is thought to lead to raising of the finger. The problem with the explanation [J1] is that the activity beginning .5 seconds earlier seems to be dissipation with a reversed arrow of time: from chaotic and disordered to ordered at around .15 seconds. ZEO explanation is that macroscopic quantum jump occurred and generated a signal proceeding backwards in time and generated neural activity and dissipated to randomness.
- (c) Earthquakes involve a strange anomaly: they are preceded by ELF radiation. One would expect that they generate ELF radiation. The identification as BSFR would explain the anomaly [L3]. In biology the reversal of the arrow of time would occur routinely and be a central element of biological self-organization, in particular self-organized quantum criticality (see [L4, L6]).

4 Some implications of ZEO

ZEO has profound implications for understanding self-organization and self-organized quantum criticality in terms of dissipation with non-standard arrow of time looking like generation of structures [L4, L6]. ZEO could also allow understanding of what planned actions - like realizing the experiment under consideration - could be.

1. Second law in the standard sense does not favor - perhaps even not allow - realization of planned actions. ZEO forces a generalization of thermodynamics: dissipation with a non-standard arrow of time for a subsystem would look like self-organization and planned action and its realization. Could most if not all planned action be like this - induced by BSFR in the geometric future and only apparently planned? There would be however the experience of planning and realizing induced by the signals from geometric future by a higher level in the hierarchy of conscious entities predicted by TGD! In long time scales we would be realizing our fates or wishes of higher level conscious entities rather than agents with completely free will.
2. The notion of magnetic body (MB) serving as a boss of ordinary matter would be central. MB carries dark matter as $h_{eff} = nh_0$ phases of ordinary matter with n serving as a measure for algebraic complexity of extension of rationals as its dimension and defining a kind of universal IQ. There is a hierarchy of these phases and MBs labelled by extension of rationals and the value of n .
MBs would form a hierarchy of bosses - a realization for master slave hierarchy. Ordinary matter would be at the bottom and its coherent behavior would be induced from quantum coherence at higher levels. BSFR for higher level MB would give rise to what looks like planned actions and experienced as planned action at the lower levels of hierarchy. One could speak of planned actions inducing a cascade of planned actions in shorter time scales and eventually proceeding to atomic level.
3. This interpretation is actually not new. I proposed in [?] that motor actions could correspond to BSFRs and sensory percepts to their time reversals. It took still some time to realize that sensory perceptions naturally correspond to SSFRs ("weak" measurements), and that both BSFRs and SSFRs can occur with both arrows of time. Motor action would be a cascade of BSFRs with each BSFR inducing sensory perceptions as SSFRs at lower level inducing in turn motor actions as BSFRs in shorter time and length scales. The above model is a generalization of this picture.

5 ZEO based model for the findings of Armor and Sacker

Could one apply ZEO also to the experiment under consideration?

1. Could one think that the experiment involving BSFR had already occurred (with respect to subjective time) when the experimenters got the idea to perform the experiment as a control signal from the geometric future? Experimenters and participants would have been like neurons in the brain of participants of Libet's experiment. They did what the already occurred experiment forced them to do. They of course had a lot of free will but not at this level of hierarchy of conscious entities but in shorter time scales and this made possible the needed preparations.
2. Experimenter informed the members of group A about the arrangement of the experiment. Therefore the members of group A concentrated on a process which was actually an attempt to remember in a reversed time direction and they were successful. The participants in group B did not know that the experiment would be arranged and made only guesses.
3. The objection is that in applications to atomic systems, Libet's experiments and earthquakes, one speaks of what an outsider with the standard arrow of time observed. Now one however talks about the participants of experiments and BSFR would now affect them. Does this really make sense?

Here the notion of MB could come in rescue. BSFR would occur at the level of a collective MB of the system involving participants and experimenters and induce the outcome of BSFR and would change the arrow of time only at this level of MB. The participants at lower levels of hierarchy would receive information from the collective MB as time reversed control and communication signals. The signals would be received if the participant tunes herself to the correct wavelength - that is performs a memory recall, which would become possible after learning that the experiment will be actually performed.

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