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The "Choice Blindness" Effect: Challenging Introspection, Intention and Choice[1]

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Abstract

The "Choice blindness" is the term Johansson et al. introduced in order to name an experimental situation in which participants do not notice that their intended choice is mismatched with the alternative they did not choose; nevertheless, they introspectively derived and offered reasons for their manipulated choices. The "Choice blindness" effect has several important features, such as not noticing the replacement of the selected object, confabulation and change in preference, which should be addressed in an attempt to explain it. The established effect proved to be robust and was replicated in numerous studies in which objections to previous studies and offered explanations were addressed. In order to explain the effect, the researchers referred to insufficient introspection and the blindness of the decision processes, as well as the underestimation of the influence of environmental and situational factors. At present there is no explanation or consensus about mechanisms behind the observed effect. The research method introduced by Johansson et al. represents a valuable tool for exploring the field of psychology of perception and cognitive psychology, and even clinical psychology and attitude research. However, there are still a lot of questions about the "Choice blindness" which should be answered.

Key words: choice blindness, change blindness, introspection

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The "Choice Blindness" Effect: Challenging Introspection, Intention and Choice

There are numerous methodological controversies in psychology and philosophy about the possibility of knowing oneself. Introspection, as a method for getting information about "inner" processes of perceiving, emotions or decision-making, was among those concepts that generated the most controversy in the history of psychology and philosophy of mind. In everyday conversations we hear people giving explanations for choices they made and things they were doing by mentioning reasons or motives which governed their behavior. However, we could cast doubt on these introspective reports, and wonder whether they are true. Nisbett and Wilson (1977) proposed a paradigm for testing hypotheses about the reliability of introspective reports, and they concluded that our introspections are confabulatory. Although their results raised great interest, almost no new experimental research of the subject emerged for almost thirty years. In an attempt to experimentally explore the confabulatory nature of introspection, Johansson et al. (2005) found an interesting phenomenon that they named the "Choice blindness" effect. The results showed that the respondents were ready to explain the choices they did not actually make by offering confabulatory reasons. The results of this first research did not only show the confabulatory nature of introspection, but also provided new insight into the process of choosing and decision-making and inspired numerous new research studies that, in addition to theoretical significance, also have practical implications, e.g., in marketing, judiciary, public opinion polling, political opinions etc.

In this paper we intended to describe the "Choice blindness" effect and the research paradigm by which it was discovered, we tried to present development of the concept, replication and additional research, its robustness and relationship with other (similar) phenomena, as well as possible explanations. This kind of presentation of previous research should provide the interested reader with comprehensive initial insight into current knowledge about the "Choice blindness" effect.

The papers reviewed here were collected from the databases: Google Scholar, PsychInfo and Web of Science (WoS). The "Choice blindness" effect, together with variations and truncations, was the sole search term. The studies were included if they met one or more of the following criteria: (1) the "Choice blindness" effect was the primary topic of the research or review; (2) the possible explanations of the "Choice blindness" effect are given; (3) the research examines the relationship of the "Choice blindness" with other similar phenomena or personality traits; (4) the variant of "Choice blindness" experimental paradigm was used in the study; (5) factors that impact the "Choice blindness" effect were investigated. After the papers were selected using the aforementioned criteria, the results, conclusions and explanations stated in them were organized according to the topics reflected by the subheadings of the following sections in order to present as many aspects of the "Choice blindness" effect as needed.

The “Choice Blindness” Effect

Johansson et al. (2005) investigated the relation between intention, choice, and introspection. They wanted to examine the basic assumption of the theories of decision-making that people detect mismatches between their intentions and following outcomes, and consequently, adjust their behavior in case of discrepancies between intended and achieved outcomes. In their experiment they showed pairs of photographs of female faces to participants and asked them to choose which face in each pair they found the most attractive. Faces in pairs were rated on similarity in preliminary investigation by different subjects and there were two sets of faces: high similarity and low similarity set. There were three choice conditions: one with 2s of deliberation time, one with 5s, and one where participants could take as much time as they needed. In other words, the respondents had 2s, 5s, or unlimited time at their disposal to observe and choose the face that they found more attractive. Unknown to the participants, experimenters manipulated the relationship between choice and outcome that they experienced, by substituting the elected photograph with the unelected using a “Double card ploy”. The “Double card ploy” is a kind of a magic trick, in which the subject chooses one of the two shown cards and then the experimenter places both cards face down on the table and slides the chosen card towards the subject and hands it to him. However, the subject does not know and in most cases cannot see that the experimenter actually slides two cards that are on top of each other; the bottom card is the one the subject chose, and the top one is the one the subject did not choose (the cards in the experimenter’s other hand are arranged oppositely). The subject takes the upper card that the experimenter slides to him, and the lower one remains lying on the table covered by the experimenter’s hand. By returning the hands, the experimenter also returns the card that remained lying on the table, covered with the palm of his hand, and it slides over the edge of the table into the experimenter’s lap. The back of the card is the same color as the table mat on which the trick is performed, in order to reduce the possibility of the subject noticing the substitution. In the described way, the subject ends up with the alternative he did not choose.

Participants were asked to elaborate the choices they made. Results showed that most of the participants (the replacement was noticed in 13% of trials, and in 27% of trials within free deliberation time and low similarity set) failed to notice mismatches between their intended choice and the outcome they were presented with. Participants were also offering introspectively derived reasons for their choices. Introspective reports which participants gave in matching and non-matching conditions were analyzed along three dimensions: Emotionality, Specificity, and Certainty (using a numeric scale from 1 to 5). The results showed that there were no differences between matching and non-matching situations in mentioned dimensions. The introspective reports were confabulatory in case of non-matching outcome. This is an interesting finding since giving confabulatory reports is a common symptom of some forms of dementia and could also be seen

in people with surgically removed connections between brain hemispheres. The authors named this effect "Choice blindness".

Johansson et al. (2006) further explored the relationship between "Choice blindness" and introspection. They used word-frequency and latent semantic analysis (LSA) to investigate a corpus of introspective reports collected within the "Choice blindness" paradigm by Johansson et al. (2013). The overall methodological approach was the same as in the previously-mentioned experiment (Johansson et al., 2005); participants were shown pairs of photographs of female faces in order to choose which face in each pair was more attractive (Johansson et al., 2013). Face pairs varied in discrepancy of attractiveness, but an attempt was made to keep similarity constant at an intermediate level (faces were clearly different, but not markedly). There were a series of 15 face-pairs per participant, with 4 s for the decision-making process. Six of the pairs were designated as verbal report-pairs, and any three of these six would be manipulated for each participant. There were eighty participants in the study so there were 480 reports collected. Manipulated trials were detected in 27.5% of the cases (Johansson et al., 2013; Johansson et al., 2006). The authors contrasted the introspective reports given in non-manipulated to manipulated trials in: uncertainty, specificity, emotionality, deceit (linguistic markers of deceit and lying), and complexity, but there was no significant difference in semantic content between the non-manipulated and manipulated reports. Reports given by participants were also analyzed with LSA (Latent Semantic Analysis). Statistical analysis of the semantic space showed that the participants justify their choice using the same semantic content for both the non-manipulated and manipulated trials (Johansson et al., 2006).

Challenging and Defending the Concept of "Choice Blindness"

Moore and Haggard (2006) disputed most of the Johansson et al. (2006) conclusions, and wondered if it is the case that all our self-reports (and especially those concerning "real" choices) are detached from reality and confabulatory by nature. Instead, Moore and Haggard referred to an important feature of voluntary action called "agency". The term agency, according to Moore and Haggard (2006, p. 693), refers to "the ability to interact with the environment through self-generated action. Agency involves specific neural processes, their physical consequences in the environment, and also a characteristic conscious experience of action control." Moore and Haggard think that "Choice blindness" is an aberrant case in which the states subjects introspect on (in this particular case motivations for action) are artificially made fallible, and because the sources of fallibility are removed, the internal information, one has about his own agency, is more reliable and more valid. Furthermore, they noted that in experiments conducted by Johansson et al. (2006), the choice that was made was actually unimportant to the respondents, given that it is unlikely that people profoundly care about face attractiveness. Therefore,

Johansson’s et al. subjects could make sense of the trick situation in one of two ways. They could either accept that the action that they made had no desired effect and they would thus accept failed agency or they could confabulate new reasons for their action, which would retrospectively turn their action successful. Because the “Choice blindness” experiment situation is artificial, Moore and Haggard conclude that confabulation is an easier method of “sense-making” than accepting failed agency. They suggested that convincing disproof of above criticism would be a demonstration of the “Choice blindness” effect for decisions regarding moral issues; these decisions are presumably less fallible and more resistant to confabulation (Moore & Haggard, 2006). Moreover, participants should justify choices that are of a more important nature, because another key issue is the experimenter-participant dynamic. The participants might suspect a mismatch between their intention and its effects, but they are unwilling to admit these to the experimenter. It would be much harder for the participants to justify choices that are more important, or if participants were given some evidence that their intentions will sometimes miscarry.

As Moore and Haggard (2006) noted, we should differentiate access to one’s reasons for performing an action, and access to the sense of agency itself (including intentions, authorship, conscious will, and so on); the “Choice blindness” apparently is the member of the former class of cases, where one has the task to introspect on the reasons for a choice, not on the process of choosing itself.

Hall et al. (2006) replied to all the objections raised by Moore and Haggard (2006), suggesting that mentioned authors misunderstood some key issues concerning the “Choice blindness” research paradigm and basic results obtained by using it. According to Hall et al., a particularly inadequate argument presented by Moore and Haggard is the one that applies to the artificiality of the “Choice blindness” research paradigm. One could ask whether it is possible to examine anything under severely controlled conditions (e.g., with certainty and without bias) and not to make such conditions artificial?

In another study, Hall et al. (2010) “replied” to the commentary concerning the artificiality of the “Choice blindness” paradigm by extending it to decisions made in more naturalistic settings. In this study, the tasting venue was not in the laboratory but at the local supermarket. They invited passerby shoppers to taste two different varieties of jam and to smell two different varieties of tea, and to decide which alternative in each pair they preferred the most. Immediately after the participants had made their choice, they were asked to sample the chosen alternative again, and to give an explanation for the choice they made. At this point, the contents of the sample containers were secretly switched, so that the outcome of the choice became the opposite of what the participants intended. The results showed that participants detected “33.3% of the manipulated jam trials, and 32.2% of the manipulated tea trials”, thus demonstrating considerable levels of “Choice blindness” for the taste and smell as well as for face attractiveness (Hall et al., 2010, p. 5). The effect “survived” even for such extremely different jams as spicy cinnamon apple vs. bitter grapefruit, or for the smell of teas like sweet mango vs. liquorice pernod, where less than a fifth of the manipulation trials was detected concurrently (and less than half counting all forms of detection).

"Choice Blindness" versus "Change Blindness"

A well-informed reader could, at this point, reasonably ask: is there any difference (or connection) between "Choice blindness" and "Change blindness" which is a well-established phenomenon? The most important finding in numerous experiments concerning "change blindness" is that the participants fail to detect changes in a scene when the change is accompanied by some other visual impediment. If there were no interruptions in the visual stream, changes which occurred in the scene would have been detected instantaneously. Experiments of this kind deepened our apprehension of the visual system functioning (especially attention mechanisms), although exact mechanisms have not yet been agreed upon (see Rensink et al., 1997; Rensink et al., 2000; Rensink, 2000; Simons, 2000; Tse et. al., 2003).

Johansson and Hall (2008) conducted three experiments in order to examine the relationship between "Choice blindness" and "Change blindness"; the authors varied both the stimuli used and the choice procedure. They used abstract patterns in the first experiment, and pictures of female faces in the second and third experiment. In all three experiments, the majority of the manipulations remained undetected, indicating that "Choice blindness" is a robust phenomenon. In these experiments, unlike previous instances, photographs were presented on the computer screen and program-controlled switching of the chosen photograph with the un-chosen one (Johansson & Hall, 2008). First two experiments showed a result pattern similar to the previous experiments, but in Experiment 3, experimenters left the faces on the screen until participants made an attractiveness rating. In this experiment, the detection rate rose to 39%, which differs significantly from the first two experiments. This difference could be interpreted as an indicator that the pictures were not fully processed after the switch in Experiment 1 and 2. A more likely reason, as authors suggested, is that the participants were allowed to look at both pictures, so they had the opportunity for making explicit comparison when they first rated the manipulated photograph and then the initially preferred picture. The authors excluded the possibility that participants noticed the switch and did not report it, because post-experimental interviews with the participants that did not notice any manipulations during the experiment showed that 85% of them believed that they would have detected such a switch if it had been performed. When the authors revealed the actual purpose of the experiment to the participants, they showed considerable surprise, and sometimes even questioned experimenters' claim that the pictures were switched.

Johansson and Hall (2008) suggested that an important difference between "Change blindness" and "Choice blindness" studies is that the latter employ quite a radical change – that is a full identity switch, although this is not completely true since there are change blindness studies with full identity switch (e.g., Angelone et al., 2003). Although a description of the "Choice blindness" experiment somewhat differs from that of standard "change blindness" experiments, this does not necessarily mean that the mechanisms differ. "Change blindness" explanations usually include some kind of mechanism for "erasing" or "overwriting" of contents

in visual short-term memory (Rensink, 2002), but these explanations were not called upon in the case of “Choice blindness” by the creators of this research paradigm. They do not assume that the intention to choose something is instantly forgotten by the participants. The main purpose of our intentions is to guide our actions. But, if this was the case, as Johansson and Hall (2008) suggested, how can the participants in their study intend to choose X, and then 1500 minutes later fail to notice when they ended up with Y?

Lind et al. (2009) further examined the relationship between intention and action using verbal material, because it is widely accepted that speech production is initiated and guided by clear pre-verbal intentions. These intentions are supposed to function as a standard against which actual performance can be measured in terms of its accuracy. The authors tried to investigate the role of auditory feedback of one’s own voice in the understanding of the meaning of self-produced speech. Participants performed a computerized variant of the Stroop test while hearing their own voice exclusively through earphones, and three of their utterances were covertly recorded. These words were then played back to them over the headphones while they were involved in a different trial of the test, which created a situation where the participants could hear themselves saying something different than what they actually said (i.e., they exchanged what participants said for something they had said earlier). This was essentially a similar situation to the one in “Choice blindness” experiments previously-described, but participants had much greater control of their actions and overall situation. Contrary to results obtained in previous studies of “Choice blindness”, results of these experiments showed that described manipulations were almost always retrospectively detected. Additionally, the majority of the participants reported that they had experienced significant confusion as to the actual source of the manipulated feedback, and not being certain if it was produced by themselves or not. Additionally, on a minority of manipulated trials, participants accepted manipulated feedback as if it was self-produced. These results definitely indicate that there is a limit in the possibility of manipulating with one’s intentions and their outcomes, which depends on the amount of one’s involvement in some action; choosing a preferred photograph from a given pair is something quite different from verbalizing our thoughts or naming a color we see.

Robustness of the “Choice Blindness” Effect

The “Choice blindness” effect has been reproduced in many different ways since its discovery and thus proven to be a very robust phenomenon, which occurs under a variety of test conditions. As previously shown, the type of used material and its presentation varied: printed pictures in live interaction (Johansson et al., 2005; Johansson et al., 2006), computer presentation (Johansson & Hall, 2008), and virtual agents (Johansson et al., 2007). Experiments were carried out in laboratory conditions or in more natural ecologically valid conditions such as supermarkets

(Hallet al., 2010). The effect is also demonstrated in different sensory modalities: vision (for example: Johansson et al., 2005; Johansson et al., 2006), audition (Lind et al., 2014; Sauerl and et al., 2013), taste and smell (Hall et al., 2010), and touch (Steenfeldt-Kristensen & Thornton, 2013). A computerized version of the "Choice blindness" paradigm with registering pupil dilation and eye-movement patterns as the psychophysiological correlates showed differences between detected and non-detected trials indicating that detection is registered in the cognitive system as a differentiable event (Pärnamets et al., 2023).

The "Choice blindness" effect is established in diverse types of judgments from aesthetic: attractiveness of abstract patterns and male and female faces (Johansson et al., 2005; Johansson et al., 2006; Johansson & Hall, 2008), fragrance and deliciousness (Hallet al., 2010), up to moral judgments in political debate (Hall et al., 2012; 2013; Rieznik et al., 2017), decision-making during voting (Hall et al., 2013; Strandberg et al., 2018), legal decisions (Sauerland et al., 2013), observer testimony (Cochranet al., 2018), financial decision-making (McLaughlin & Somerville, 2013), and even in the clinical domain by researching the problem of feigning (Merkelbachet al., 2011). With the aim of examining the possible impact of increased awareness on the "Choice blindness" effect, one study involved people who practice meditation and it was expected that mindfulness meditators should be better in noticing the ploy and the mismatch (Lachaud et al. 2022). The results showed higher likelihood of detecting manipulations in the mindful group (experienced mindfulness meditators) compared to the control group (naive to mindfulness meditation), due to "better introspective access and control of reasoning processes acquired during practice and not by the latent characteristics that are attributed to the mindfulness trait" (Lachaud et al. 2022, p. 1607).

Previous research on factors that can have an impact on the "Choice blindness" effect occurrence confirmed that alternatives similitude (Hall et al., 2010; Sauerland et al., 2013), and familiarity (Hall et al., 2012), as well as choice complexity (McLaughlin & Somerville, 2013) are important. Perception of false feedback in a visual task of the "Choice blindness" effect is increased by positive emotions (Huangfu et al., 2019). On the other hand, the influence of social desirability (Aardema et al., 2014), and compliance (Sauerland et al., 2013) is not confirmed.

It is also quite reliably established that respondents consistently change preferences with their own erroneous attributions, since altered feedback is processed and integrated in the following decision processes (Hall et al., 2010; Pärnamets et al., 2020). Later memories and preferences are thus affected (Johansson et al., 2013; Pärnamets et al., 2015; Strandberg et al., 2018).

Attempts to Explain the "Choice Blindness" Effect

The "Choice blindness" effect has several important features, such as not noticing the replacement of the selected object, confabulation after being faced with an alternative they did not choose, and change in preference, which should

be addressed in an attempt to explain it. The key question is why participants do not notice the replacement of the object they chose previously. In an attempt to answer this question, researchers referred to insufficient introspection (Bortolotti & Sullivan-Bissett, 2021; Chen & Risen, 2010; Hall et al., 2013), and the effect was likewise attributed to the blindness of the decision processes, specifically to the non-conscious reasons for our choices (Petitmengin et al., 2013). The underestimation of the influence of environmental (participant's physical surroundings) and situational factors (general context of the situation in which participant is currently in, e.g., participating in an online experiment) was also taken in consideration as the explanation of the effect (Ariely & Norton, 2008; Hall & Johansson, 2008; Hallet al., 2010; Pärnamets et al., 2015). Respondents' failure to encode or to attend to the choice options properly is seen as another possible factor for their failing to detect manipulations, but research has shown that this is not the valid explanation (Pärnamets et al., 2015).

Studies on the possible role of working memory in "Choice blindness" did not provide unequivocal explanations. For instance, variation in detection rate cannot be explained by working memory overall capacity (Poorun et al., 2018). However, there were more detections when viewing time of the alternatives during decision-making was unlimited in contrast to the limited time of 2s or 5s (Johansson et al., 2005). Similarly, when more recently perceived alternatives were manipulated, the detection rate of the manipulation was greater (Sauerland et al. 2013). It has been established that participants detect manipulations more likely with the progression of the experiment when manipulations become more frequent, thus indicating increase in their vigilance or decreasing trust in feedback (Taya et al., 2014).

It is interesting to note that the "Choice blindness" effect appears even when participants are informed directly that false feedback will occur and were given the task to detect it. Despite the information that the alternative they chose will in some cases be replaced by the one they did not choose, the respondents failed to notice the mismatch in 24% of cases. A study showed that true and false feedback discriminability, level of activation of the monitoring mechanisms and prior beliefs regarding feedback reliability have an impact on the "Choice blindness" effect emergence (Vogel et al., 2023).

The effect of social interaction between a participant and an experimenter on participant's withholding to report the detected false feedback was as well considered and examined using a computerized "Choice blindness" task with registering psychophysiological correlates (pupil dilation and eye-movement patterns) with conclusion that these factors differ significantly between detected and non-detected trials so participants' reception of the manipulation can be taken as it is (Pärnamets et al., 2023).

There were researchers who tried to explain the "Choice blindness" effect by dissonance and a respondent's lack of motivation to participate in cognitively demanding tasks, but the importance of these factors in the occurrence of the effect has been disproved by results of the recent experiments. Strandberg et al. (2019) conducted a survey of political attitudes in which participants were also asked to

elaborate on some of the answers they gave. Three of these answers were selected and manipulated to indicate an opposite position. The respondents noticed and corrected 58.4% of the manipulations. The extremity, centrality and commitment for each attitude were measured. Preference for consistency, need for cognition and political awareness of the participants were assessed one week prior to the experiment. It has been shown that correction of the manipulations could be predicted only by extremity score. The authors concluded that results brought out the elusiveness of "Choice blindness" and disproved "dissonance and lack of motivation to engage in cognitively demanding tasks as explanations why the effect occurs" (Strandberg et al., 2019, p.2884).

For the time being just a few studies attempted to explore and connect the "Choice blindness" effect with other psychological constructs. For instance, cognitive reflection tests, as a measuring tool for critical thinking, showed individual differences that could predict "Choice blindness" (Strandberg et al., 2018; 2019). Participants with better general analytic skills were shown to be more prone to correct the manipulations in "Choice blindness" setting (Strandberg et al., 2018).

Conclusion

The authors of the concept and research paradigm of "Choice blindness" showed that the vast majority of respondents did not notice that the substitution was made in the experiment, although it is likely that respondents, actually, could have quite reasonable reasons for their preferences in the situation in which they assess which person or template from the given pair is more beautiful (Johansson et al., 2005). The authors never denied that people have very specific intentions in this kind of behavior, but the phenomena such as "Choice blindness" show that this should not be taken for granted in the decision-making tasks. The established effect proved to be robust and was replicated in numerous studies in which objections to previous studies and offered explanations were addressed. As is usually the case in science, new research not only provided answers and deepened our knowledge, but also raised new questions and pointed out new problems. For instance, experiments have shown that manipulations done during the "Choice blindness" effect sometimes have long-lasting effects, given that the following false feedback on initially non-chosen faces ratings increased when participants rated them a second time (Johansson et al., 2013).

Although at present there is no explanation or indication of mechanisms behind the observed effect, we should, according to Johansson (2006), review the concept of intention and reconsider introspection.

The research method introduced by Johansson et al. can be used as a tool for exploring the field of psychology of perception and cognitive psychology, and even in clinical psychology and attitude research, but there are still a lot of questions about the "Choice blindness" which should be answered. The role of instructions given to participants, as well as the degree of their interest for the choosing between given

alternatives in the experiment and the explaining of the involved mechanisms are certainly among the key questions that deserve to be answered.

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Efekat „Slepila izbora“: izazov za introspekciju, nameru i biranje

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Apstrakt

„Slepilo izbora“ je termin koji su Johanson i saradnici uveli kako bi imenovali eksperimentalnu situaciju u kojoj učesnici ne primećuju da je njihov nameravani izbor zamenjen alternativom koju nisu izabrali, ali ipak introspektivno stvaraju i nude razloge za svoje izmanipulisane izbore. Efekat slepila izbora ima nekoliko važnih karakteristika, kao što je neprimećivanje zamene izabranog objekta, konfabulaciju i promenu u preferencijama, kojima bi se trebalo pozabaviti u pokušaju da se efekat objasni. Utvrđeni efekat pokazao se robustnim i repliciran je u brojnim istraživanjima u kojima su razmatrani prigovori na prethodna istraživanja i ponuđena objašnjenja. Da bi objasnili efekat, istraživači su se pozivali na nedovoljnu introspekciju i nepostojanje uvida u sam proces odlučivanja, kao i na potcenjivanje uticaja okolinskih i situacionih faktora. Trenutno nema objašnjenja ili saglasnosti oko mehanizama koji su u osnovi uočenog efekta. Metod istraživanja koji su uveli Johanson i saradnici svakako predstavlja dragoceno oruđe za istraživanje u oblasti psihologije percepcije i kognitivne psihologije, pa čak i u kliničkoj psihologiji i istraživanju stavova, ali postoji još mnogo pitanja o „slepilu izbora“ na koje bi trebalo odgovoriti.

Ključne reči: „slepilo izbora“, „slepilo za promene“, introspekcija

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