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From reaction ('priming') to motivated selection: changing conceptualizations of accessibility

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The past few years have brought to light the weaknesses of social cognition in both paradigms and published results. Although for 'social priming' at least, the need for remedying these weaknesses has not diminished — the effort would benefit from a parallel increase in theoretical rigor. With this goal in mind the current paper charts the development of conceptions of mental accessibility from initial ideas of passive 'spread of activation' or of bottom-up increase in accessibility to a notion of accessibility that is sensitive to the organism's current goals, as well as other concerns. A relevance-based framework for mental accessibility can accommodate results as diverse as 'saying is believing' and relevance based-'blindness'.

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The question of how and in what sense does the human mind 'represent' the external world was a topic of much philosophical debate [1]. Notably, for scientists working at the mental or cognitive level there is currently no viable alternative but to accept the fact that somehow the mind does come to represent the world and that these (mental) representations are somehow appropriately activated given their referent in the world.

Subfields in psychology vary quite substantially in the degree they use mental representation and its dynamics as theoretical explanations. Within social psychology, a group of researchers that sought to apply basic (cognitive) principles for explaining socially relevant phenomena, such as how do we form impressions of others (person perception), were among the first to put these ideas to

work. As we shall show, changes in the focus of social cognition (as this sub-field came to be called) led to further changes and additions to the hypothesized mechanics of mental representation.

In this paper, we begin by reviewing the history of these changes, including our own later modification that was a break from previous notions of mental accessibility within social cognition (and cognition generally). In reviewing each of these 'phases,' we emphasize their contributions to the development in thinking about the functions, mechanics and explanatory power of mental activation rather than their empirical content per se.

From priming linguistic concepts to priming social knowledge (traits, stereotypes and attitudes)

The method and concept of priming, as well as a set of related ideas (availability, accessibility, activation and applicability; [2^{••}]), were introduced into social psychology in the late 1970s and early 1980s. Although the idea of priming per se originated within classic cognitive psychology and psycholinguistics, its nature and the set of related ideas changed when they were applied to phenomena that interested social psychologists. The first applications of this explanatory machinery targeted both 'chronic' (cross-situational or 'trait') and 'transient' (situational or 'state') biases in person perception ([3[•]]; but see also [4]). These applications also led to basic models that linked what were then thought to be the sole factors behind the reactivity to information (in the 'accessibility' sense of representations acquiring a 'tendency to be activated'): the frequency and recency of exposure to the information [5,6[•]]. Although not fully developed, the key theoretical addition to the mechanics of accessibility in this phase is *applicability*, which is the precursor to our principle of relevance. Applicability was the match between a (select) set of the stimulus' and the activated concepts' features [7]. Notably, applicability was necessary to explain why not all accessible constructs are 'blindly' used (see also [8]). The necessity for such a selective phase was driven by the fact that all former stages in the sequence of stimulus to activation were passive and fully depended on previous exposure history. This first generation of priming-based work evolved into the still very active and influential social psychological field of automatic attitudes (e.g. [9]), which generally accepts the passive dynamics of activation outlined above (with the important exception of constructivist models of attitudes).

From primed social knowledge to primed behavior

The second generation of accessibility theorizing and empirical work focused on the activation of complex *behavior* by environmental cues. The theory is that after sufficient repetition the representation of behavior becomes associated with the representations that are consistently simultaneously activated ('what fires together wires together'). Differing from both classic and modern theories [10–12], the idea here is that any perceptual cue, either relevant or *irrelevant* to the original intention of the action, acquires the potential to activate the behavior. Thus, being exposed to words related to old age may activate the behavior of walking slowly even in the absence of older people in the current environment [13[•]] or being exposed to a cue related to a library may activate the behavior of speaking quietly even when not in a library [14]. Please note that we focus here on the changing understanding of accessibility that the above hypotheses reflect, which is a separate issue from their empirical verification. The study by Bargh *et al.* [13[•]], for example, has repeatedly failed to replicate directly (but see the study by [15] mentioned below).

From primed behavior to primed action

The third generation of theorizing and investigating accessibility dynamics shifted focus from 'automatic' activation of isolated and seemingly purposeless and discrete behaviors to temporally extended and phenomenally flexible actions that were deemed to be directed by unconscious goals. Beyond the additional mental machinery that was added to theories supporting these ideas, the key novel idea was that goals are themselves mental representations that are subject to (more or less) the same principles as other mental representations. Specifically, the idea was that a goal, being a mental representation, is also activated by external cues (e.g. features of an environment or situation [16[•]]; or people [17]). Activation did not depend on the involvement of the conscious perceiver and in this sense was 'automatic' or 'unconscious'.

Here things get a bit more complicated because the functions of the goal representation were hypothesized to be similar to theorized functions of conscious goals. To meet this end, activated goals were assigned the following functions: the assignment of value to goal relevant stimuli [18]; the allocation of effort in a goal relevant manner [19]; and the monitoring of progress toward the goal (e.g. 'shutting off' their own activation when the goal was met) [20]. One prominent theory that attempted to accommodate most of the above functions is the theory of goal systems [21] which assigns goals their unique controlling status by placing them at the top (or beginning) of a spread of activation hierarchy and also enabling the spread of affect 'on' the connections between the representations of the goals (and their means).

From reaction ('priming') to active selection

About six years ago, we outlined a framework that we called 'ROAR' for Relevance of Accessible Representations [22^{••},23]. The main purpose of ROAR was to offer a framework linking the representation of semantic knowledge with that of motivation. A secondary aim was to integrate as many 'accessibility-dependent' effects as possible from diverse fields (psycholinguistics; social cognition; cognitive psychology) within a coherent mechanistic framework. The proposed solution was rather simple: knowledge becomes accessible, which we defined as being 'functionally available' to cognitive processes, to the degree that it is *motivationally relevant*. Building on Higgins' [24] parsing of motivation we also offered three possible sources of motivational relevance; namely, the mind's concern with 'truth' (what is real), 'control' (what I can make happen), and 'value' or 'outcome' (what is desired/undesired).

A first application of this framework was to the striking change in recall that is induced by people tailoring their message on some topic to create a 'shared reality' with the feelings or beliefs of their audience about the topic (for the analysis of other memory effects within the ROAR framework, see [25]). The 'saying-is-believing' phenomenon was discovered by Higgins and Rholes in 1978 and has been recently systematically studied by Higgins, Echterhoff and their colleagues (e.g. [26]). It is not surprising that participants will create a 'shared reality' with their audience on some topic, such as a target person, by tuning their message toward the audience's feelings or beliefs about the target given that a key pillar of being an effective human communicator is to take the audience into account [27].

What is more surprising, and is certainly significant, is that when the message tuning occurs as a consequence of a shared reality goal — but not when it occurs as a result of other goals (e.g. to make the audience like you) — the message is treated as the actual truth about the target and communicators' recall of the target's behavior is distorted to be consistent with the tuned, that is, biased, message rather than the original information. For example, if the evaluative tone of the message was tuned toward the attitude of the audience toward the target, then communicators reconstruct the *original* information about the target to be evaluatively consistent with the evaluatively biased message.

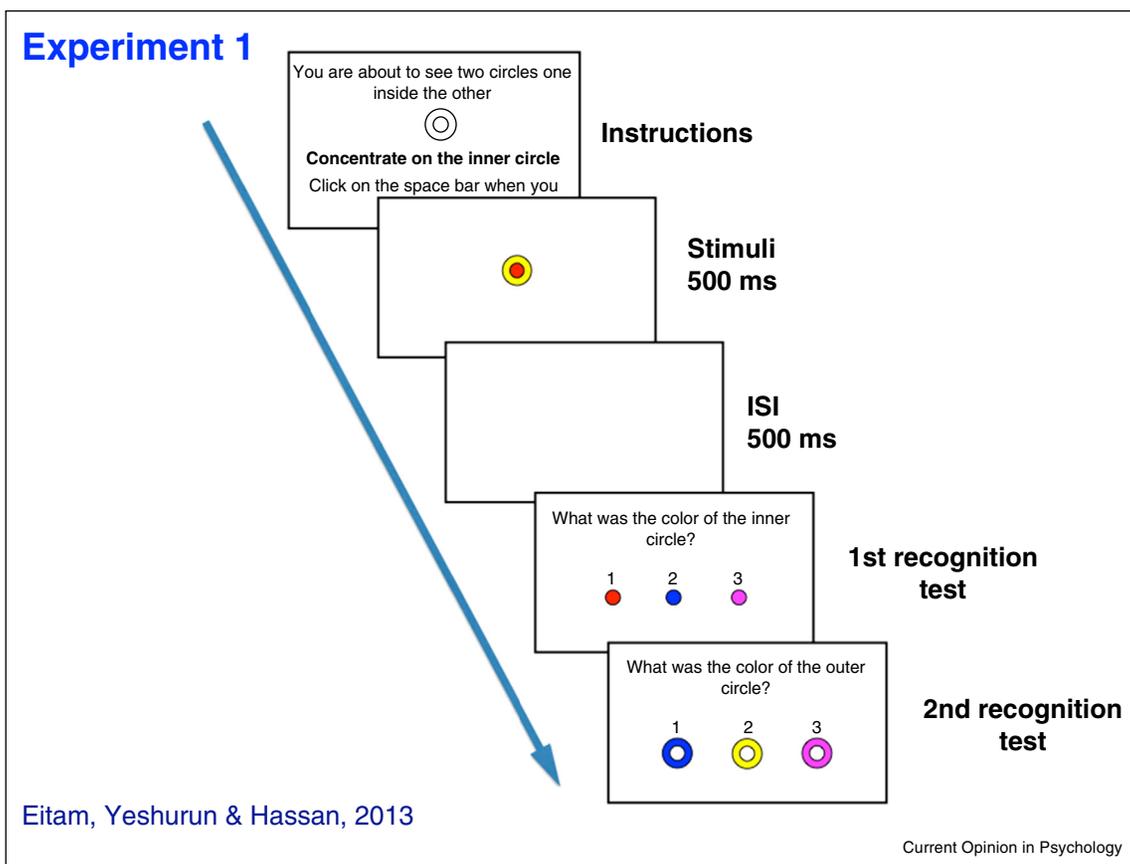
Note that this effect was shown not to be a simple case of source forgetting, elaboration or partial forgetting of information [28]. As mentioned above, this 'saying-is-believing' effect occurs only when participants tune their message toward the audience in order to create a shared reality with the audience. It does not occur when participants merely tune to be polite or ingratiate their audience [29], despite the degree of audience tuning being at least as great in these cases. Another unique feature of this phenomenon is that it has been shown to be sensitive to

epistemically relevant factors: the shared reality-memory bias is greater when participants' confidence in their own ability to make accurate judgments of others is weak versus strong [30], and, key to our current concerns, the biased memory effect disappears when participants are notified just before recall that their reality was not in fact shared by the audience [31].

Let us elaborate a bit further on this latter effect. When participants follow the exact same procedure of tuning their message about the target to the audience but, before they are asked to recall the original information about the target, they are told that the audience was not able to identify whom they were talking about on the basis of their message, that is, there was a failure to create a shared reality, then there is no memory bias. Note that this is true even though the conditions for encoding, retention and elaboration were not affected in anyway because this information processing occurred before this new feedback information was given. This effect is consistent with the ROAR framework because the later feedback about a failure to create shared reality can still reduce the truth relevance of the message, thereby reducing its accessibility and thus its impact on recall (see also [32]).

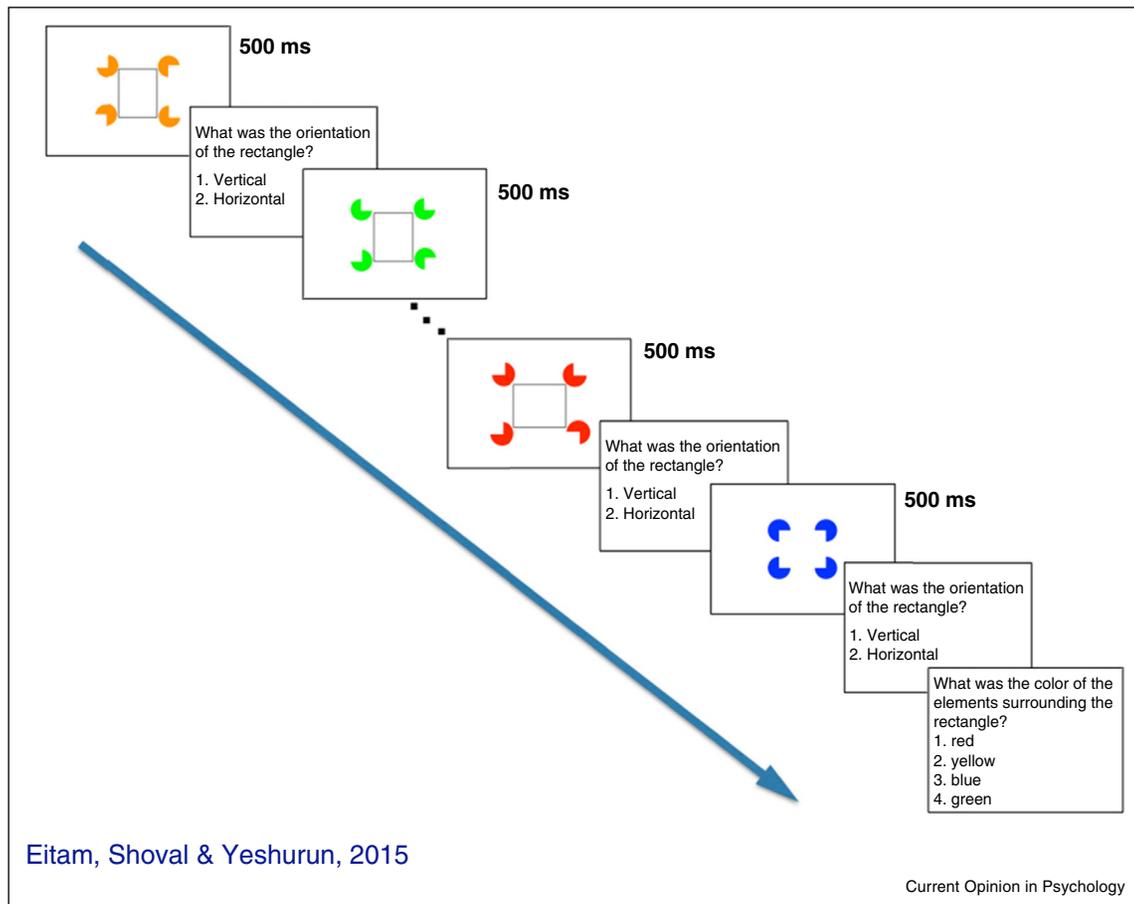
The ROAR framework has recently generated another, very different, line of research — dissociating between 'knowing' and (consciously) 'experiencing' [33]. As ROAR places the locus of selection on activation of semantic knowledge as a function of motivational relevance, it is tempting to test how far can this idea be pushed. While some hypothesized selection processes in cognitive science and neuroscience are consistent with the claim the selection is based on 'top-down' modulation of semantic associative areas [34], others emphasize selection on the basis of largely spatial (e.g. 'object'; [35]) or perceptual features (e.g. 'color' or 'shape'; [36]). Consistent with the ROAR prediction, a series of experiments [37] showed that merely instructing people that one of two locations is *task relevant* (e.g. the outer of two differently colored concentric circles) led to 'blindness' to the information appearing in the second location (task irrelevant location). For example, up to 25% percent of the participants could not report the color of the (irrelevant) inner circle that was presented for 500 ms without any masking (see Figure 1). Given that ROAR stipulates that the effect of relevance is on the activation of knowledge, we hypothesized that people were not 'phenomenally blind' to the irrelevant percept but rather, could not report what it was because, given that is was not

Figure 1



A trial from Experiment 1 in Eitam *et al.* [36]. A first demonstration of 'irrelevance induced blindness' up to 25% of the participants could not report the color of the single irrelevant concentric circle they had just seen for 500 ms.

Figure 2



A trial from Experiment 1 in Eitam *et al.* [31]. A case of 'seeing without knowing' — although participants' performance on the (relevant) categorization of the Kaniza rectangle was near perfect they were significantly worse on naming the (irrelevant) color of the rectangle's inducers.

relevant, it failed to activate the corresponding knowledge (i.e. become accessible). This prediction was confirmed in a study in which participants that were ostensibly 'blind' (in the sense of non-accessibility) to the inducers of a Kaniza illusion (see Figure 2) nonetheless displayed the illusion by 'successfully' judging the orientation of the (relevant) illusory shape [33]. Importantly, this extension of ROAR supplies some grounding to claims that the phenomenal experience is in fact spared from relevance-based selection (cf. 'phenomenal overflow'; [38]) in the sense that people cannot report the irrelevant stimuli that impact the phenomenal experience.

The above examples show that even a crude mechanistic model of mental accessibility that interacts with the motivational relevance of stimuli (from truth, control, or value motivation) can be a promising framework for both predicting and explaining social-cognitive phenomena, as well as cognitive phenomena more generally. As such, the theoretical understanding of accessibility should be distinguished from various 'priming' mechanisms that may or may not reflect the dynamics of mental activation as proposed by ROAR.

Finally, understanding the relation between motivational relevance and the activation of mental content may explain some variability in the results of different studies using similar priming and/or measurement of 'accessibility' (e.g. using lexical decision tasks). For example, although we mentioned above that Bargh and colleagues' classic study whose findings supported the hypothesis that behavior is directly activated by priming-related concepts failed to replicate, [15] did show that the behavioral outcome of priming (including the behavior observed by Bargh *et al.*) differed as a function of the perceivers' attitude toward the primed category. Granting the statistical noise inherent in testing such small effects (not to speak of their modulation), this may be an example in which taking into account not only the 'sign' of an attitude (is it positive or negative) and its behavioral implications, but also its current relevance (intensity of attitude toward that target category) could determine the strength (or the existence) of a priming effect.

Conflict of interest statement

Nothing declared.

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- of special interest
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