

## SIMULATION

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(First published March 31, 2018)

It.: *Simulazione*; Fr.: *Simulation*; Germ.: *Simulation*; Span.: *Simulación*. The term comes from the Latin *simulatio*, which derives from the verb *simulare*. The Latin verb means “imitate”, “feign”, or “copy” and it in turn derives from *similis*, which means “similar” or “like”.

In scientific and philosophical contemporary debates, the term simulation is used with various, although intertwined, meanings. To catch these different meanings and their complex relationships, a very useful starting point is the use of the term in the cognitive sciences. In particular, according to the so-called “grounded theories” (Barsalou 2010), simulation represents a basic human capacity and constitutes a unifying computation principle across diverse processes in the brain. Simulation provides the “re-enactment” of perceptual, motor, and introspective states acquired during experience with the world, body, and mind. “As an experience occurs, the brain captures states across the modalities and integrates them with a multimodal representation stored in memory. Later, when knowledge is needed to represent a category, multimodal representations captured during experience with its instances are reactivated to simulate how the brain represented perception, action, and introspection associated with it” (Barsalou 2008: 618). In this perspective concepts are simulators, that is, distributed patterns of multi-modal simulations associated with category’s instances frequently experienced (Barsalou 2012).

### THE CONTEMPORARY DEBATE

With this basic idea in mind, it is possible to address the complex network of meanings of simulation in the contemporary debate. In this network, two meanings seem to be crucial: the first one explicitly connects simulation to “imagination” (and the related concepts of mimesis, fiction, make-believe, modelling, and creativity); the second one explicitly links simulation to “mind reading” (and the related concepts of mirroring, perspective-taking, and empathy).

A) Imagination can take very different forms and it does not permit a simple taxonomy (Gendler 2011). However, according to a general consensus, one of the main uses of the term considers imagination as a specific form of simulation (Currie 1995). Precisely, imagination provides not referentially constrained

simulations. According to the conception of simulation as the re-enactment of previous experience, imagination can re-enact sensations, perceptions, beliefs, desires, emotions, objects, situations, and even global experiences, yet as imaginings they are invitations to imaginatively simulate, that is to imagine without real-world reference and factual truth conditions. In this perspective, to imaginatively simulate something is not to be committed to its truth: imaginings are referentially void and do not have referential force (Schaeffer 1999).

Connected with imagination, simulation can be both “reproductive” and “productive”. In the first case, simulation is similar to “mimesis” to the extent that it imitates, reproduces, and recreates the intended counterpart, even if it is not an exact duplication of the counterpart. This kind of simulation is closely related to “make-believe”. In the domain of “fiction” recipients know very well that representations are simulations decoupled from the actual state of affairs and that real-world truth conditions are irrelevant. They accept a kind of “fictional agreement”, acknowledging that the authors simulate, that is, they act “as if” the stories were actually true. In this perspective, works of fiction are guides to make-believe (Walton 1990; Currie 1990).

Associated with creative imagination, simulation is similar to “world-making” to the extent that it creatively defies expectations and conventions and it is closely related to “modelling” (Oatley 1999; Oatley 2016). Sciences regularly appeal to simulations and models to understand complexes made up of multiple interacting processes. From these processes new properties emerge that cannot be predicted in advance from the low-level interaction. This is also true for the domain of fiction. Fictional simulations follow the emerging trajectories concerning the interactions of selves in the social world (Mar and Oatley 2008).

B) In the contemporary debate simulation is also explicitly connected with mind reading (called also “folk psychology”, “theory of mind”, or “mentalizing”). Mind reading is the everyday ability to make sense of the behaviours of others: it allows us to understand others as intentional agents and to engage in shared activities (Tomasello 2014). Today the prevailing hybrid accounts share the idea that mind reading constitutes a heterogeneous set of different social-cognitive skills and that simulation represents a key component of this set (Nichols and Stich 2003). As a consequence of simulation, one attributes mental states and predicts what other do by engaging similar processes in oneself. These processes are “as if” simulations: they run off-line and use pretend-representations that resemble their intended counterparts; they insert pretend-beliefs in reasoning mechanisms and feed pretend-goals into the decision-making mechanisms without generating real-world decisions and behaviours (Goldman 2006).

It is important to stress that the second meaning of simulation, based on the link with imagination, and the first meaning of simulation, based on the link with mind reading, share a common ground, centred on the pivotal conception of simulation as the re-enactment and the re-experience of another mental state. The first kind of re-experience is an intrapersonal simulation, which involves a self-directed simulation. The second kind of re-experience is an interpersonal simulation, which involves an other-directed simulation (Shanton and Goldman 2010). Moreover, the second meaning of simulation requires a direct role of imagination. There is a widespread agreement in distinguishing two types of mind reading and two associated types of simulation (de Vignemont 2009). The first one is very simple; it is based on automatic,

unconscious, pre-reflexive mechanisms; it does not involve inferences and propositional contents. The basis for such mind reading is automatic “mirroring” and unmediated resonance for other’s emotions, feelings, intentions, and actions (Iacoboni 2005; Gallese and Sinigaglia 2011). In contrast, high-level mind reading engages the complex use of imagination as a constructive process that allows individual to assume the other’s perspective. This is an imagination-driven simulation based on “perspective-taking” and aimed at removing imaginatively any relevant disparities between the simulator and the target.

This kind of simulation based on perspective-taking can be exclusively cognitive: an individual represents and understands the mental states of another person, without being emotionally involved. In contrast, when an individual shares an isomorphic affective and emotional state with another person and she or he is conscious that this other person is the source of the affective state, simulation becomes “empathy” (de Vignemont and Singer 2006).

## SIMULATION IN AESTHETICS

In recent years, there has been a real explosion of interdisciplinary studies on simulation in the aesthetic domain. In particular, philosophical aesthetics, empirical approaches to aesthetics, philosophy of mind, social, cognitive and media psychology, and different subdisciplines of neurocognitive sciences have investigated the nature, the main mechanisms, and the effects of the fictional simulation.

At present, a growing body of neuroscientific evidence suggests that fictional processing overlaps with many key brain areas that support our capacity to simulate experience outside of the “here-and-now”, such as thinking about the future and the past, mentally constructing places and spaces, imagining hypothetical events, simulating others’ mental states (Mar 2011). According to this evidence, understanding fictional simulations exceeds the mere information gathering. “Readers perceive the events in fictional stories as the likelihood that something might have been, which leads to an active simulation of events – similar to the simulation of a possible past or a possible future” (Altmann *et al.* 2012: 26). Thus, the available evidence supports the idea that fiction represents a kind of simulation that promotes the exploration of opportunities and possibilities in the social domain; that fiction engages a simulative processing that is isomorphic to ordinary mind reading; that, according to the neuroplasticity literature, the repeated engagement in the social simulations provided by fiction may have positive effects on social cognition.

Many empirical findings collected by social, cognitive, and media psychology show that these effects largely depend on transportation, “a convergent process, where all the mental systems and capacities become focused on events occurring in the narrative” (Green and Brock 2000: 701). Transportation is a mental journey into the imagined world of the fictional simulation and occurs when an individual departs from the real world, is fully engaged in the simulation, experiences high imagery, identifies with the characters, and is emotionally struck by the simulation. There is general consensus that transportation plays a pivotal role in determining the persuasive effects of fictional simulations by reducing counterarguing and disbeliefs (Green and Brock 2002). Transported individuals tend to be unwilling to

actively dispute or reject the fictional simulation, because they do not want to disrupt their enjoyment by breaking out the narrative world to critique points made in the story. Moreover, transportation typically facilitates connections with characters, leads to vivid mental imagery, and triggers strong emotional responses, other key factors that boost the believability of the messages and therefore facilitate persuasion.

In the last few years, many empirical studies focused on the net effect of fictional simulation on several cognitive processes, namely beliefs, emotions, empathy, attitudes, and reflections. However, this research is at an early stage and presents weak, hesitant, tentative, and mixed findings. For example, in one of the most interesting lines of research Kidd and Castano (2013) reported that a brief, one-time exposure to a short excerpt of literary fiction can immediately enhance cognitive empathy, that is the ability to understand the other's perspective without emotional involvement. Although various replications and extensions found similar results (Black and Barnes 2015), two recent studies with larger samples, and so with a greater statistical power, did not replicate them (Panero 2016).

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#### HOW TO QUOTE THIS ENTRY

G. Consoli, *Simulation*, "International Lexicon of Aesthetics", Spring 2018 Edition, URL = <https://lexicon.mimesisjournals.com/archive/2018/spring/Simulation.pdf>, DOI: 10.7413/18258630023.

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