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Keywords
rethinking, embodied, psychology, situated, social

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Rethinking Situated and Embodied Social Psychology

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ABSTRACT

The present paper aims to explore the scope of a Situated and Embodied Social Psychology (ESP). At first sight, social cognition seems embodied cognition par excellence. Social cognition is first and foremost a supra-individual, interactive and dynamic process (Semin & Smith, 2013). Radical approaches in Situated/Embodied Cognitive Science (Enactivism) claim that social cognition consists in an emergent pattern of interaction between a continuously coupled organism and the (social) environment; it rejects representationalist accounts of cognition (Hutto & Myin, 2013). However, mainstream ESP (Barsalou, 1999; 2008) still takes a rather representation-friendly approach, that construes embodiment in terms of specific bodily formatted representations used (activated) in social cognition. We argue that mainstream ESP suffers from vestiges of theoretical solipsism, which may be resolved by going beyond internalistic spirit that haunts mainstream ESP today.

Keywords: *Social Psychology, Situated Embodied Cognitive Science, Enactivism, Perceptual Symbols Systems, Ecological Psychology*

Word count: 10.997

1. Introduction

The past decades Situated and Embodied Cognitive Science (hereon Situated/Embodied Cognition) has become increasingly influential in psychology and philosophy of mind. Briefly, it holds that the mind is inherently determined and structured by the body and the environment, or in a more radical version, that the mind extends over the body and the environment (for overviews see Clark, 2008; Shapiro, 2011). Situated/Embodied Cognition implies a break with longstanding assumptions within classic cognitive science (hereafter Cognitivism), most notably the mind as essentially a stand-alone system, running on (sub)symbolic representations decoupled from current states of the agent's body and her environment (De Bruin & Kästner, 2011).

The rejection of representations in explaining intelligent behavior is a common thread in Ecological Psychology (e.g., Chemero, 2009; Richardson, Shockley, Fajen, Riley, & Turvey, 2008) and Enactivism (De Jaegher & Di Paolo, 2007; Thompson, 2007; Varela, Thompson & Rosch, 1991). These approaches assert that if the mind is properly understood as embodied and situated, the object of investigation is a coupled brain-body-world system that has no (or minor) need for decoupled control systems, i.e. mental representations (Chemero, 2009; Hutto & Myin, 2013). Challenging static and individualistic conceptions of (social) cognition, radically Situated/Embodied approaches emphasize emergent patterns of interaction between organism and environment.

The subject of this paper is how different approaches and ideas in Situated/Embodied Cognition relate to the field of Social Psychology. Whereas smooth dyadic interaction between two agents fits the interactive and emergent picture that Situated/Embodied Cognition proposes, mainstream accounts within Social Psychology emphasize embodied simulation, where reenactment, the activation of a sensori-motor representation is assumed to constitute understanding of the other's intentions. This is not quite the same as on-line

interaction: the embodied simulation account puts the cognitive agent's neural reenactments of *internal* perceptuo-motor routines central rather than a genuine dyadic and dynamic interactive process.

In the extensive literature on embodiment in Social Psychology (Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005; Meier, Schnall, Schwarz, & Bargh, 2012; Semin & Smith, 2002, 2008, 2013), there seems to have been little interest in the potential role of radically situated/embodied cognition (besides some notable exceptions, see Marsh, Johnston, Richardson, & Schmidt, 2009). Semin and Smith (2013), who have written extensively on the applications of Situated/Embodied Cognition for Social Psychology, raised similar concerns about the narrow coverage of embodiment. They point out that social cognition is intrinsically situated, distributed and emergent; it is a function of dyads, groups and social networks, not of lone thinkers (p. 139). Yet, although Semin and Smith (2013) seem to be sympathetic towards a more dynamic and interactive perspective on social cognition, they do not seem to realize the full theoretical consequences of such a perspective (cf. Schilbach, 2013). As we will show below (section 3), the notion of embodiment in Social Psychology is usually construed in a rather narrow way, and remains close to traditional representationalist views (Section 3), as decoupled from the environment (e.g., Niedenthal et al., 2005).

1.1 Goals & Overview

The aim of the current paper is to provide a broad contrast of Radical Situated/Embodied approaches with the popular embodied perspective in Social Psychology. We firstly introduce the philosophical ideas that resonate with either Cognitivism or Situated/Embodied Cognition. This introduction should provide us with a broader picture wherein Cognitivism and Situated/Embodied Cognition do not fundamentally stem from rival and directly testable theories, but rather from differing philosophical worldviews (Van Dijk, Kerkhofs, Van Rooij, & Haselager, 2008). In section 3, we provide a theoretical introduction

of the Embodied Simulation approach (most notably Barsalou's [1999, 2008] Perceptual Symbol Systems account) and show how this approach can be philosophically positioned, as compared to Radical Situated/Embodied Cognition, such as Ecological Psychology and Enactivism (Section 4). We will conclude that there is room and necessity for broadening the theoretical foundations of Social Psychology.

2. Philosophical worldviews in cognitive science

An account of the philosophical roots of Situated/Embodied Cognition can only be selective and simplified (for a broad overview see Gallagher, 2009). Historically, Merleau-Ponty's (1962) *Phenomenology of perception* is among the sources of Embodied Cognition, and more recently, theorists like Clark (1997); Dreyfus (1972); Varela, Thompson and Rosch (1991). We offer two (simplified and perhaps extreme) sets of fundamental assumptions and insights, each linked with the theories outlined in upcoming sections. Our (secondary) sources are neo-phenomenologists and neo-Heideggerians like Wheeler (2007), Ratcliffe (2007), and Gallagher (2005, 2009). For the sake of brevity we will refer to the sources of Cognitivist worldviews in philosophy as Cartesian, and the sources of Situated/Embodied Cognition as Heideggerian.

2.1. Cartesian ideas in psychology

Cognitivism has often been characterized as sharing many assumptions that align with René Descartes' (1596-1650) view (hereon Cartesian view) on the relation between mind and world (e.g., Semin & Smith, 2002; Glenberg, 2006). Cognitivism has dismissed the original Cartesian dualism between the mind (*res cogitans*) and the body (*res extensa*) but it still accepts his dualism of the mind and world, subject and object (Wheeler, 2007). It is the assumption that the epistemic situation of a cognizing agent is one in which there is an objective pre-given world on the one side and the subject's model of it on the other: the mind mirrors the world (Rorty, 1979). This involves the notion of representations. Representations

are constructed by enriching, and inferring information from, otherwise meaningless and underdetermined sensory stimuli. Thus the Cartesian Psychologist "postulate[s] the existence of systematically organized, (ultimately) neural inner states whose functional role is to *stand in for* (usually external) objects and situations…" (Wheeler, 2007, p.58).

Another Cartesian assumption of Cognitivism is that intelligent behavior can be broken up into smaller cognitive modules. A general pattern that unfolds in individuating these modules is one of sense-represent-plan-move cycles (Wheeler, 2007). This proposed serial process implies that intelligent behavior unfolds by *decoupling* perception and action. Lower-order modules (perception and action) are only indirectly connected through mediation of higher-order modules (representing and planning). Moreover, the Cartesian Psychologist would conceive behavior in which perception and action are *directly* coupled without the intermediate control of higher-order modules either impossible, unintelligent or problematically inflexible (e.g., instinctive behavior, reflexes etc.). Thus "the bulk of intelligent human action is the outcome of general-purpose [higher-order] reasoning processes" that a) retrieve the relevant representations given the current behavioral context and b) manipulates, combines and transforms these representations appropriately as to determine what to do (Wheeler, 2007, p. 76). Evidently, the agent's *situatedness* is down-played in the above understanding of intelligent behavior; higher order reasoning mechanisms that draw on reconstructed representations of that situation prevail. The role of the non-neural body and the environment are only relevant insofar as they are neurally represented.

The Cartesian assumption regarding social cognition is that the mind is inherently a subjective domain – a mind inhabited with decoupled and private representations. From it emerges the well-known 'problem of other minds' which means that the human agent can never definitively know whether other human agents have experiences just like her. It is therefore held that behaviors of others are intentionally *opaque* since the representational

states (e.g., intentions, beliefs, desires) from which (social) actions supposedly spring are tucked away in the body (Gallagher, 2005). The Cartesian is therefore left with the project of investigating how people come to *represent* the contents of other minds. This takes the form of employing a representational mechanism which allows for the modeling of others' mental states. For example, according to the 'Theory Theory' (e.g., Leslie, Friedman, & German, 2004) when perceiving another's behavior one can attribute a mental state onto the other (e.g., emotions, beliefs, desires) by using mentally represented propositional attitudes which are either learned or the product of an innate mechanism. These scripts are constantly changed on the basis of the success of the inference in social practices. In contrast 'Simulation Theory' denies that humans employ such a theory since we can model others' mental states on the basis of our own (e.g., Heal, 1986; Goldman, 1989).Although variations of both theories differ on whether these inferential processes need to be conscious, they share the Cartesian project of postulating the existence of mental representations of others' mental states (for an overview see Ratcliffe, 2007).

2.2 Heideggerian insights

Having briefly sketched out the philosophical assumptions in Cartesian Psychology we now turn to one of the philosophical sources of Situated/Embodied Cognition. Martin Heidegger (1889-1976) is mentioned across several sources in this context (e.g., Niedenthal et al., 2005, p.186; Semin & Smith, 2001, p. 236; Wheeler, 2007).

Martin Heidegger's work is rooted in the philosophical tradition of Phenomenology which takes as its object of inquiry the structure of experience or consciousness. One of the primary concerns of Heidegger in *Being and Time* (1962) is the meaning of Being. Heidegger believes that an appropriate step in understanding the meaning of Being is to turn to human phenomenal experience; after all humans have an implicit grasp of what it means for things to be. Heidegger asserts that if we turn to experience, we primarily find ourselves *in* a world,

rather than viewing the world from a detached standpoint as the Cartesian subject-object distinction implies[1].

Heidegger does acknowledge that entities can be encountered from a detached – and in some sense Cartesian - standpoint (which he terms encountering entities as 'present-at-hand'). For example (not Heidegger's), if I take the time and stop my activity of typing and look at my keyboard, I can contemplate the shapes on the board and all its attributes - which surely follows the Cartesian view of a subject pitted against the object. However, we generally do not encounter things in such an intellectual and theoretical way. Rather, things are encountered as usable, affording possibilities for action in the context of ongoing activity. Heidegger terms this way of relating to entities as 'ready-to-hand', so as to emphasize that we always have our hands in it (Ratcliffe, 2007).

Heidegger emphasizes the significance of the phenomenal structure of everyday common-sense situations where we are not *thinking* but *acting*. The intelligent agent becomes unreflectively absorbed and merges with the entities that are manipulated in ongoing activity. This particular structure of awareness which negates the experience of the subject-object contrast to a radical extent, is what Heiddeger terms *circumspection* (Wheeler, 2007). In stark opposition, the Cartesian subject-object, and mind-world dichotomy implies that epistemic access to the world can only be gained through world-mirroring mental representations. Circumspection, in which the agent relates to entities as ready-to-hand, particularly arises in hitch-free active engagement. Wheeler (2007) gives it the term *smooth coping*; an active engagement of the agent in the world, occurring in a real-time interaction with the environment, and relying on fluid context-specific responses (Wheeler, 2007). *Smooth coping* involves a particular kind of knowledge. Whereas the Cartesian kind of epistemic access is

[1] For this reason Heidegger avoided the traditional conception of the *subject* in his analysis of the understanding of being - redescribing an intelligent agent as *a* there-being, a *Dasein*.

detached registering which yields a propositional general reason-based *knowing-that*, the Heideggerian agent primarily relies on a more practical *knowing-how* constituted in an ongoing dynamic body-world interaction (i.e., smooth coping). Indeed, it is Heidegger's emphasis on the human agent as actively involved with the environment that motivates the appreciation of extra-neural factors (which can be bodily, equipmental, or social) which "reveal themselves to be the unexpected root of the very adaptive flexibility and richness that is normally attributed to representation-based control" (Wheeler, 2001, pp. 217-218).

As mentioned above, Heidegger does leave room for encountering entities in a more detached present-at-hand way. Then, our mode of relating to the world undergoes a phenomenological shift, where we lose our unreflective grip on the situation, where entities light up *as objects* (Wheeler, 2007, Chapter 5). This is a step towards the theoretical Cartesian attitude, although it is still the case that these are according to Heidegger encountered in the context of *that* activity, not as fully context-free objects but as what Wheeler (2007) terms "practical objects". Indeed, Heidegger stresses that even in situations where unreflective smooth coping is absent or is disrupted, are we always already in a world of practical significance (Heidegger, 1962). The important epistemological implication is that *the epistemic mode of practical smooth coping is primary*, and that the *objective theoretical mode is derived.*

How is the Heideggerian view related further to social cognition? In the Cartesian view, the agent relates himself to the other by simulating, modeling or inferring other's mental states from the underspecified perceptual stimulus (the other). In the Heideggerian view, the agent becomes attuned to others in pragmatic situated contexts. As Gallagher & Jacobson (2012) state about the Heideggerian view of Social Cognition:

> We encounter them [the other] as agents already engaged with us in a meaningful project. Their meanings and our understanding of them are directly tied to the instrumental or social situation in which we encounter them. In normal unproblematic circumstances there is no further mystery, nothing extra hidden away that we need to theorize about. Nor do we require a simulation process to bridge a gap between ourselves and others, since in everyday life *we are them* (original emphasis, p.217).

The claim here is that social interaction (primarily) operates on a social (e.g., dyadic) level that cannot be reduced to individual analysis (De Jaegher, Di Paolo, & Gallagher, 2010). We will discuss below how this resonates with radically situated/embodied appeals for considering the cognitive system as a constitutively open wherein its components can spread beyond the individual and include the environment (De Jaegher & Di Paolo, 2007; Riley, Richardson, Shockley, & Ramenzoni, 2011). As we will see, in Radical Situated/Embodied Cognition the question is how social agents interact *in* rather than construct representations *of* the social environment. In the next sections we shall further explore how these Heideggerian ideas carry over to todays situated and embodied approaches of social cognition.

3. Embodied Simulation

3.1 Perceptual Symbol Systems: Embodied Cognition and the grounding problem

In this section we will discuss the basic framework what we have called the Embodied Simulation account, focusing on Barsalou's Perceptual Symbol Systems account of cognition (PSS; Barsalou, 1999, 2008; Niedenthal et al., 2005) and to a lesser extent on related perspectives (e.g., Gallese & Lakoff, 2005; Glenberg & Kaschak, 2002).

Arguably, Barsalou's PSS account became popular in the discourse as a situated/embodied perspective in Social Psychology since it provided an account of how social stimuli affected the body (e.g., mimicry) and how bodily states produced cognitive and

affective states (Barsalou et al., 2003; Niedenthal et al., 2005). Furthermore these findings seemed to provide a solution for the so-called symbol grounding problem as introduced by Searle (1980) and elaborated by Harnad (1990). The problem is that symbolic mental representations, as posited by Cognitivism, are unable to acquire meaning since symbolic codes are arbitrarily related to their perceptual referents (just like the word "dog" is an arbitrary symbol for the concept of a *dog*). In Cognitivism it is theorized that the symbols (e.g., dog) re-acquire their meaning from the network of symbols they are part of (e.g., mammal, pet; Block, 1995). However the problem posed by Harnad (1990) remains: symbols cannot acquire meaning by sheer reference to other meaningless symbols.

Barsalou (1999, 2008) aims to resolve the symbol grounding problem by further elaborating on the Empiricist notion that knowledge (or thought) is derived from (correlates of) perception. In the PSS account the knowledge of for example the concept dog is *grounded* in previous experiences with dogs. As such thinking about a dog, or recognizing a dog, relies on reactivations of neural patterns in multiple modalities (e.g., auditory system, visual system etc.) that were activated during previous encounters with dogs. These modality-specific activation patterns are bound by higher-order-cross-modal associations that establish a multimodal representation, a *Perceptual Symbol*. These perceptual symbols are equivalent to Damasio's convergence zones which consist of hierarchically structured conjunctive neurons that interconnect different modality-specific information (Damasio, 1989). Importantly, these simulation processes primarily operate on a sub-personal level but may be mediated and accessed by consciousness (Barsalou, 1999, 2008).

Whereas Cognitivism proposes abstract and formal symbol structures that are transduced and recoded, and thus amodal, i.e., no longer coded as sensory modalities, in the PSS account representations are always perceptual or embodied (Barsalou, 1999). Therefore,

no grounding problem should arise since there are no arbitrary relations between concepts and their referents (see however Shapiro, 2010).

The PSS account further employs the important notion of *situated conceptualization* which can be viewed as "an agent-dependent instruction manual that delivers specialized packages of inferences to guide an agent's interactions with particular category members in specific situations" (Barsalou, 2005, p.626). Further building on this proposal, Glenberg & Kaschak (2002) suggest that this simulation process offers a way to derive affordances (possibilities for actions) in the sense of Gibson (1979). Barsalou (2009) further elaborates how situated conceptualization processes relate to experience:

> Situated conceptualizations place the conceptualizer directly in the respective situations, creating the experience of "being there". By reenacting an agent's actions and introspective states […] the situation is not represented as detached and separate from the conceptualizer (p. 672).

As such, situated conceptualization aims to explain how the human agent intelligently relates to and acts in the situation at hand (Barsalou, 2009). According to the PSS account, when a modality-specific component of a stored situation is activated, situated conceptualization offers the agent a way of filling in the remaining pattern of this situation by simulations of non-observed components. Such a process supposedly allows the agent to anticipate for certain not-yet observed components of the situation as well as to intelligently (re)act given the experience that she has had in similar situations.

3.2 The Embodied Simulation Account of Social Cognition

In the PSS account sensori-motor states are coupled to the representational system. Namely, actual body states can interfere or moderate simulations that are recruited during

situated conceptualizations. For example, people are quicker (slower) in verifying the sensibility of sentences (such as "Andy delivered the pizza to you vs. You delivered the pizza to Andy") when their response actions complemented (contrasted) the implied motion of the sentences (backward vs. forward hand-movement; Glenberg & Kaschak, 2002). Furthermore, bodily states can offer possibilities for inference such that somatic (e.g., elevated heart rate) and motor responses (e.g., stepping back in a conversation) influence the interpretation of a situation (Niedenthal et al., 2005). Another way that actual sensori-motor states are coupled to cognitive activity is when simulations trigger actual executions such that for example motor-simulations "leak into" the motor-system (such as in the case of hand-gestures; Hotstetter & Alibali, 2008). Yet, Barsalou (2008) states "Bodily states are not necessary for cognitive activity, although they can be closely related to it" (p. 620). Unfortunately, the PSS account is far from clear when and why bodily states contribute anything over and above the simulation process: "On some occasions, actions may only be simulated. On others, actions may be simulated with only traces appearing in behavior—not full-blown execution. On still other occasions, simulations may trigger full execution of the respective actions" (Barsalou et al., 2003, p.77).

Recently, the discovery of mirror-neurons in monkeys and humans has been connected with the notion of sensori-motor representations in developing an alternative model of basic interpersonal understanding, called the Embodied Simulation account (Gallese & Sinigaglia, 2011; cf. Gallese & Lakoff, 2005). According to this account, much like the classic Simulation Theory (ST; Heal, 1979), an agent can understand others by reusing one's own mental states in order to understand the other. The embodied simulation account of social cognition suggests that the simulation process relies on the activation of neural substrates that resonate to perceived bodily actions of the other. The key mechanism in such a process is the Mirror Neuron System (MNS). The MNS has both perceptual and motor properties which

enable the agent to match actions performed with actions perceived. As such the MNS provides a basis on which implicit simulation processes can be scaffolded such that agents are able to *"retrodict the targets mental states, moving backwards from the observed action*" (Gallese & Sinigaglia, 2011). For example there are mirror neurons that fire when a target object is grasped, as well as perceived to be grasped by another agent (for an overview see Gallese & Sinigaglia, 2011). Furthermore, some mirror neurons resonate to a goal (such as reaching for a peanut), not just a motor movement (e.g., the sight and the sound of cracking peanuts evoke the same response). Thus this account assumes that interpersonal understanding is a process of embodied resonance, which allows for representing another person's mental states.

3.3 Some empirical examples of embodied simulation

In this section we will give a few examples of research addressed in the landmark publication by Niedenthal and colleagues (2005) wherein they distinguish between on-line and off-line cognition. It is suggested, that on-line cognition "is intimately tied to the relevant modality-specific processes required to interact with the environment effectively". In contrast off-line cognitive activity is characterized as decoupled from the environment and is reliant on processing in modality-specific systems and bodily states (Niedenthal, 2005, p). This distinction will turn out to be important in understanding the radical (Heideggerian) version of embodied cognition. Note that the distinction between on-line and off-line cognition involves crude concepts that may only have value in contrasting extreme ends of a continuum (coupled-decoupled).

3.3.1. On-line Social Cognition and PSS

A classic topic in Social Psychology concerning social interactions is that of mimicry and imitation. It is well established that newborn infants less than 2 hours old can, and often do imitate others' facial gestures such as mouth opening, lip or tongue protrusion (Meltzoff &

Moore, 1983). Furthermore, in conversations people often come to imitate each other's speech characteristics (e.g., latency and rate of speech; Capella & Planalp, 1981) and tend to mimic other's emotional facial expressions without explicit awareness (Bush, Barr, McHugo, & Lanzetta, 1989; Dimberg, Thunberg, & Elmehed, 2000). According to the PSS account bodily mimicry should facilitate cognitive processing of (emotional) stimuli as well as induce (emotional) states compatible with these bodily expressions. Indeed, a range of studies show that participants are more efficient in discerning different types of facial expressions when they (can) mimic these expressions themselves (e.g., Walbott, 1991; Strack, Martin, & Stepper, 1988; for an overview see Niedenthal et al., 2010). As such, Niedenthal and colleagues (2010) suggest that imitation can be understood as an embodied simulation process, and performing or simulating facial expressions is the source of understanding others' facial expressions.

Another range of studies focuses on the role of motor states such as approach and avoidance in (social) attitude formation. In a now famous study by Cacioppo, Priester, and Bernston (1993) participants were asked to evaluate unfamiliar Chinese ideographs in terms of pleasantness whilst performing an arm flexion versus extension action (puling upward or pushing downward on a table). It was found that participants performing the arm flexion versus extension action judged the ideographs to be more pleasant. Recently similar effects were obtained regarding evaluating social impression formation; presenting a set of photographed faces during arm flexion versus extension increased (decreased) participant's evaluation of the faces' trustworthiness (Slepian, Young, Rule, Weisbuch, & Ambady, 2012).

Another line of research in ESP investigates the grounding of abstract conceptualizations in concrete bodily experiences (Barsalou, 2008). For example, putting participants in physically warmer conditions makes participants feel psychologically closer to others (IJzerman & Semin, 2010) and become more trusting during investment games (Kang

et al., 2010). Furthermore, the association between physical warmth and feelings of psychological distance is bi-directional: people judge the ambient temperature to be lower when psychological distance is greater (Zhong & Leonardelli, 2008). These findings and others (Meier, et al., 2012) are often suggested to resonate well with the PSS account in that social knowledge is constituted in multi-modal representations that involve simulations of bodily experiences(Barsalou, 1999).

3.3.2 Off-line Social Cognition and PSS

Niedenthal and colleagues (2005) suggest that there is plenty of evidence of PSS account in off-line social cognitive processes, where there is no direct interaction between agents. For example, in a study by Vanman, Paul, Ito, and Miller (1997) participants were asked to imagine individuals whom they might later had to collaborate with on a problem-solving task. It was found that participants were more likely to show positive facial reactions (measured through EMG) during imagination when they imagined a competent (vs. incompetent) or ethnically similar (vs. different) individual. In related study by Andersen, Reznik, and Manzella (1996) it was found that participants that were presented with supposedly fictional descriptions that were actually descriptions of people they personally know and felt close to(versus random descriptions) participants tended to produce more positive facial gestures.

Investigating approach-avoidance embodiments, Förster and Strack (1997, 1998) demonstrated that motor-actions can facilitate retrieval from memory if the movement is compatible with the information retrieved. In these studies participants were asked to generate names of famous people as well as to report on the extent to which they liked the person named. During the generation of the names participants had to perform an approach (vs. avoidance) motor-action (muscle flexion vs. extension). In this set-up people were more likely to generate names of famous people they liked (vs. disliked) when performing the approach

(avoidance) action. In a similar way Riskind (1984) found that participants' speed of memory retrieval of positive (vs. negative) life events was influenced by their posture: positive events were remembered quicker when participants adopted an erect (vs. slump) body posture and positive (vs. negative) facial expression.

3.4 Discussion: PSS between embodiment and representationalism

Now that we have given a brief overview of Embodied Simulation with Barsalou's PSS account as its representative for ESP we will attempt to relate this to the previous philosophical reflections. To reiterate, in the previous sections on Cartesian and Heideggerian insights sketched two general views that underlie thinking in Cognitivism and Situated/Embodied Cognition, respectively. Situated/Embodied Cognition aims to undermine central tenets of Cognitivism, most notably the mind as an information processing system manipulating (sub)symbolic representations, which are virtually decoupled from current states of the agent's body or her environment (De Bruin & Kästner, 2011).

The PSS account does not reject representations; social cognition involves the utilization of a particular kind of represented knowledge. It is thus a Cartesian view, in the sense that mental structures do enrich the view of the world, adding something to the bare stimulus. Barsalou and colleagues' (2009) notion of an agent's feeling of 'being there' requires representations to add meaning to the sensory input. We might be inclined to understand Barsalou's ideas of "being there" to resonate well with Heidegger's *Da-Sein* (There-Being), encountering the world in a non-detached way, as ready-to-hand. However, Barsalou seems to take an entirely different perspective, starting off with an underdetermined percept that affects the agent's inner world of Perceptual Symbols. This Perceptual Symbol System categorizes presence-at-hand facts (categorical inferences) which then reveals - through some cognitive gymnastics (Chemero, 2009) - the world as ready-to-hand. This is played out in situated conceptualization in that we have, say, the perception of a hammer: a

visual activation pattern that reaches the threshold of the visual component of the hammer-simulator which then opens up the possibilities for actions (affordances) based on re-activations of motor-actions. In normal interaction with the world the PSS account seems to imply that simulations are always running to understand the situation at hand. As we will see, radical approaches in Situated/Embodied Cognition reject this view as it assumes a heavy-duty simulation system where none is needed during pragmatic engagement with the environment (De Jaegher & Di Paolo, 2007).

Indeed, Julian Kiverstein (2012) has recently suggested that PSS does not explain, but rather presupposes a "context of a wider set of skills and practices in virtue of which we know how to find our way about in the world" (pp.746). Kiverstein's (2012) analysis contrasts the conservative (in our scheme, Cartesian) view of embodiment, including Barsalou, with a Heideggerian view, exemplified by Dreyfus (1972). The conservative view, retains a computational view of the bodily mechanisms underlying (social) cognition. Drawing on the Heideggerian tradition, Enactivism sees the experience of "being there", in a meaningful world, as grounded in tacit pre-reflexive bodily skills and practices. However, Kieverstein points out that an account of the sense-making characteristic of our daily being-in-the-world is absent in the traditional approach; Following Dreyfus' famous criticism of classical symbolic AI, he suggests that Perceptual Symbols are just as problematic. Namely, Barsalou presupposes a meaningless situation that becomes meaningful through systematically employing world-enriching, albeit sensori-motor, representations. However, Perceptual-Symbol-Systems occur against an already present meaningful tacit holistic background of skills and practices, about which Barsalou has little to say.

One might wonder whether Kiverstein's criticism of Barsalou is entirely justified. The point of PSS is that these symbol systems re-enact direct sensory experience and interaction with the environment, and thereby do connect to the real world. So, whatever the value of

Kiverstein's critique of PSS, his analysis brings out once more that the radical Enactivist account of embodiment should be carefully distinguished from the more conservative and reformist views of embodiment, retaining representational explanations.

The PSS account seems especially powerful in explaining how knowledge, particularly the kind of conceptual abilities that human agent possesses, is utilized in cognitive situations such as imagination, inference of social information (stereotypes), and thinking of abstract concepts. Furthermore, the PSS avoids the Fodorian symbolic *Language of Thought* (Fodor, 1975), as distinct from the information provided by the senses. As such, it has been suggested that the project of Embodied Simulation is a promising account for re-connecting decoupled cognitive engagement with basic perceptual systems and as such, albeit indirectly, with the body and the environment (Anderson, Richardson, & Chemero, 2012).

Having said that, we think that the PSS account unduly inserts what is characteristic for off-line cognition onto on-line cognition (cf. de Bruin & Kästner, 2011). We can see this in the way Niedenthal and colleagues (2005) identify the role of PSS in on-line cognition. In the previous sections we have used the term *smooth coping* to appreciate a particular kind of on-line cognitive engagement, namely cognition occurring in a real-time interaction with the environment, and relying on fluid context-specific responses. On-line *social* cognition, we would suggest, is paradigmatic in those situations where interactions with others are actualized. However, most of the social psychological experiments reported in Niedenthal et al.'s (2005) overview of on-line cognition do not involve rich social interactions. For example, it is reported that when participants were subliminally presented with pictures of happy expressions tend to react with slight smiles (Dimberg, Thunberg, & Elmehed, 2000). The PSS account would suggest that execution or simulation of the motor-configuration of smiles aids "social information-processing". Such explanations are Cartesian in the very sense that the focus lies on *perception, information processing, and representation* rather than

genuine *interaction*. Consider for example that infants have difficulty to direct their attention at their mother and even become distressed when watching a video-replay of the mother, which is not the case for infants that have a direct video-link with their mother (Bigelow, Maclean, & MacDonald, 1996). From the PSS account, these situations are not easily distinguishable; in both situations the social environment should trigger simulations that make the encounter meaningful. Thus, the body has the function of constituting that very interaction, rather than of maintaining some kind of neural simulation. As such, Niedenthal and colleagues (2005) one-sidedly narrow the continuum of on-line/off-line cognition by ignoring the affordances in dynamic social encounters[2].

Thus Embodied Simulation as solely an account of sensorimotor bodily processes at the neural representation level remains dualistic, despite its self-acclaimed synthesis of body-mind (cf. Glenberg, 2006). We can therefore conclude that embodied simulation is to some extent still an ambiguous, semi-Cartesian notion, when considered from a Heideggerian perspective.

4. Radical Situated/Embodied Cognition

In this section we will address the approaches in Situated/Embodied Cognition that we have grouped under the term "radical" (cf. Chemero, 2009; Hutto & Myin, 2013). We will start with Ecological Psychology (Gibson, 1979; Chemero, 2009). Although almost exclusively concerned with perception and action, Ecological Psychology provides some seminal ideas for Situated and Embodied Social Psychology viz. emergent organism-environment systems, and circular causality. Next, we will discuss insights from Enactive accounts of social cognition.

4.1 An Organism-Environment system: Ecological Psychology and beyond

Gibson's Ecological Psychology (Gibson, 1979; Looren de Jong, 1995) has always been an outsider in Cognitive Science, but is now increasingly re-considered (e.g., Chemero, 2009; Reed, 1996). Gibson's Ecological Psychology can be historically situated in the wider movement of Naturalism which contends that mental processes must be investigated with regard to the environment and the organism's interaction with it (Looren de Jong, 1995).

Gibson (1979) rejected the traditional view of visual perception as the mental reconstruction of two-dimensional input (light hitting the retina) into a three-dimensional representation (Chemero, 2009). Rather, perception should be understood as non-inferential, non-representational and involves the direct pick-up of information in the environment. Gibson further argued that the function of perception is not information processing but guidance for action, more precisely the detection of *affordances* - opportunities for actions. Affordances are "action-referential properties of the environment that may or may not be perceived (Michaels, p. 137)". And action must be understood as "coordinated movements, guided by information, in the service of some goal" (Michaels, p. 138). Some ecologists distinguish *effectivities* from affordances; these are the properties of the animal that allow an action in an environment, and as such the complement of affordances. An action requires the mutual compatibility of affordances and effectivities (a flower affords sitting for a bee, not for a human). Thus, affordances are not solely properties of the environment, nor to be equated with bodily dispositions, rather they constitute dynamic action-capabilities of an organism-environment system.

For the Cognitivist approach organism and environment are logically distinct systems (Richardson et al., 2008; Gibson, 1979). Instead the Ecological approach posits that the organism and the environment should be studied as one system (an *organism-environment [O-E]* system) in which its components are dynamically coupled and constitutively

interdependent. The behavioral system is taken to be a *non-linear dynamical system* (Coey, Varlet, Richardson, 2012). In this system, behavior *emerges* through reciprocal interactions between *local* components of the system and the *global* behavioral state of the system (Coey et al., 2012). These emergent patterns of behavior are *self-organizing,* and do not require central control and planning by neural representations and programs.

The notion of an O-E system negates the intuitive distinction of perception and action. As Richardson and colleagues (2003; p. 174) put it: "visual perception entails a pair of eyes, set apart, in a head that can turn and that is attached to a body that can move from place to place. Significantly, such systems are […] actively engaged in the detection of information". Importantly, the notion of an O-E system is crucial for Enactive accounts of perception (O'Regan and Noë, 2001). In such an account the idea of a dynamically coupled perception-action system is taken to its extreme, such that the phenomenal differentiation of the senses (hearing, seeing etc.) are not to be explained by the physiology of the sense-organs per se, nor does phenomenal consciousness originate from brain-regions where the inputs of these sense-organs are sent to. Rather, perceiving is something we do, and relies on the laws of sensori-motor contingencies. Phenomenal consciousness arises from sensori-motor know-how that is specified in lawful patterns that arise out of action and perception: "Thus, visual sensation and visual perception are different aspects of a person's skillful exploratory activity (that is, exploratory activity guided by practical knowledge of the effect movement will have on nervous influx)" (O'Regan & Noë, 2001, p. 970).

Here we see a similarity with the Heideggerian idea that an agent's *activity* in the environment opens up the possibility of a *direct grasp* of the world. Affordances are directly perceived through picking up invariants in the ambient optic array in ongoing action. This is in line with the Heideggerian notion of ready-to-hand in which the meaning of an entity is disclosed by the ways it can be used by the agent in the context of ongoing activity. Thus,

rather than a *perception*-represent-plan-*action* sequence, perception and action constitute a continuous cycle. This puts the ecological tradition close to the Heideggerian notion of smooth coping.

How to generalize the Ecological perspective to Social Psychology? Consider that the environment can also be a social environment which makes *social affordances* possible (Rietveld, 2012; Marsh et al., 2009). Examples being: A pause in a conversation affords talking, a friend's sad face invites comforting, and a lifted hand of a significant other affords a 'high five'. Another special aspect of the social in Ecological Psychology lies in the interactive practices it affords. This can be appreciated if we consider that the components of the O-E system change dynamically and are open to form new couplings with other elements that then become part of that very system. As such, in dyadic social interaction the components of two O-E systems become shared and should in effect be treated as one coordinative structure or an O-O-E system (Riley et al., 2011).

To sum up, ideas from ecological psychology could be considered the launching pad for a radically embedded and embodied Social Psychology (Marsh et al., 2009). These are: perception-action cycles, subserving smooth coping, which unfold in an emergent supra-individual system that cannot be reduced to individualist simulation processes. The practical engagement with the world is the basic mode of intelligent action, disclosing the world for the agent without the need to invoke mental representations.

4.2 Ecological Psychology in social context: some examples

In this section we discuss research on social behavior broadly within the framework of Ecological Psychology. We will specifically be focusing on several representative examples that implies that social interaction should be regarded as a single dynamical unit (Richardson, et al., 2010).

Interpersonal coordination (e.g., swinging one's arm with another person's arm) emerges through coupled oscillator dynamics in which stabilities (in-phase coordination with another) are unconsciously attained (Richardson, et al., 2010). For example, when subjects are asked to perform a rhythmic movement task (e.g., swinging in a rocking chair) whilst watching a co-actor's movements, they automatically and unconsciously synchronize their movements with the other (Richardson, Marsh, & Schmidt, 2005; see also Schmidt, Bienvenu, Fitzpatrick, & Amazeen, 1998). This synchronization is dependent on constraints in the environment. For example, when less visual information of the others movement is available synchronization is thwarted. Or when speed of swinging is increased participants shift from out-phase to in-phase. This suggests that social interaction allows synergies between components of O-E systems that can be modeled as one single dynamical system. For example, Anderson and colleagues (2012) describe an experiment by Harrison and Richardson (2009) that investigated how social movement systems form single coherent units. Participants in this study were paired and instructed to walk or jog one behind the other at a comfortable pace whilst being connected with a 75 cm long appendage. Interestingly, it was found that leg movements become coordinated with a preference for quadruped movement patterns (i.e., pace, trot; coordinated leg movements similarly to animals with four legs). Anderson and colleagues (2012, p. 8) note that this multi-legged coordination can occur "without direct neural-muscular coupling but also that the organizational mechanism for stable interpersonal motor control does not have to be a centralized mental or neural-cognitive structure".

More importantly, from the O-O-E system established in social interaction new "entrained" affordances emerge. For example, Marsh and colleagues (2009) discuss the plank-moving paradigm of Asch (1952) in which participants move planks of various lengths but can only touch the ends of the plank. Subjects shift between cooperative and solo modes

relative to body-scaled ratio, thus relative to size of the plank and both individuals' arm span (Isenhower et al., 2010; Richardson et al., 2008). Thus individuals are directly attuned to the other's action capabilities in relation to their own bodily limitations. Furthermore, when two individuals had a similar arm span relative to the planks they made similar action-mode transitions (using one hand vs. two hands to pick up a plank; solo action and cooperative action). Essentially this entails a new emergent organism-organism-environment system. In an experiment by Chang, Wade, & Stoffregen (2009) adult-child dyads were asked to judge passability of an aperture as a couple. It was found that perceivers judged the passability of the aperture precisely on the basis of the body-scaled information of the dyad as a whole. Several studies in Social Psychology show that interpersonal coordinated behavior elicits feelings of one-ness, suggesting entrainment on a phenomenal level (see Marsh et al., 2009). We should note that, although these social situations entail social cooperation directed at the environment and not so much interpersonal coping, it does show that social coordination (which arguably presupposes interpersonal coping) is a highly emergent and dynamic process.

5. Enactivism and Embodied Social Psychology

Enactivism is a view on life and mind (Varela et al., 1991) and has interesting implications for the way we relate to the *social* world through our bodies and in the active engagement with others. Furthermore, Enactivism seems close to the Heideggerian view, and constitutes something like a theoretical basis for a more Radical Situated/Embodied Psychology. Recall that according to Cognitivism the basic way we cope with the social environment relies on attributing, through propositional inferences, a mental state of the other (e.g., emotions, beliefs, desires). The common phenomenological objection is that such a theoretical and indirect stance is at odds with everyday intersubjective experience (Gallagher, 2005). One of the arguments against the Cognitivist accounts as Theory Theory or Simulation Theory is that much of our social experiences have a feel of *immediacy* (Gallagher, 2005;

Ratcliffe, 2007). For example a smile is directly perceived as meaningful and may solicit a range of actions (e.g., smiling back) that at least phenomenally does not unfold through a multi-step inferential process.

Another problem of the *cognitivist'* description is that agents are viewed as 'voyeurs'; observing without actively interacting with others (De Bruin, 2010). Setting up social cognition in a voyeuristic situation increases the need to employ inferential processes or simulation processes that impose social meaning on supposed undetermined social stimuli. Instead, Ratcliffe (2007) argues that if we take the personal and interactive nature of social encounters seriously it leaves much room for the dynamic bodily engagements which constitute intersubjective experience. As Rietveld (2012) puts it in an phenomenological analysis of *social* affordances, these are solicited by the environment without "goal representation or pre-existing sense of what is adequate in advance of our performance in a particular situation" (Rietveld, 2012, p. 25). Imagine for example an emotion-laden conversation with a friend. The fluidity in which facial expressions are picked up, the transitions of speech emerging automatically, suggests that at the phenomenal level conceptual recognition of others' beliefs, emotions, desires or intentional states are absent (Gallagher, 2005; see also Gallagher & Varga, 2013 for an account of direct perception and other social psychological phenomena). It is precisely because this experience in active social interactions is not accounted for in Cognitivism that the body's expressiveness of others subjective experience is overlooked. As such phenomenologists insist that we interact with others as *bodily subjects*, in which mind and body of others are perceived as integrated wholes as opposed to the body occluding the content of the mind – the notorious "other minds" problem (see Section 2). In contrast in the traditional theories of mind-reading the focus is on passive social *perception,* with extra-perceptual inferences soliciting action. Thus the important point we can take home is that the "spectatorial" picture offered by Cognitivism

does not fit the phenomenology of everyday social interactions (De Jaegher & Di Paolo, 2007; De Jaegher, Di Paolo, & Gallagher, 2010).

What then is social interaction more than social perception? Social perception is passive and temporally impoverished one-way lane; picking up social stimuli which are then further processed independently from the body and the environment. Social interaction is a temporally rich, dynamic and drawn out affair. An analogy being drawing: "One draws, responds to what one has drawn, draws more, and so on. […] making the whole development a mutual affair rather than a matter of one-way determinism" (Bredo, 1994, p.28). For De Jaegher & Di Paulo (2007) to do justice to this temporally rich interaction and what it means for social cognition new concepts are needed. In their Enactive approach (Varela et al., 1991) the notions *autonomy* and *sense-making* are introduced to understand life and cognition in general (cf. Thompson, 2010), and these notions can be extended into the social interactive domain as *participatory sense-making.*

According to the Enactivism in order to count as a living organism, a system must have *autonomy*. Autonomy means that the agent has the self-generating capacity to maintain her identity. Importantly the organism's exertion of autonomy is partly constituted by the dynamical emergence of novel forms of identity (e.g., integrated sensorimotor engagements as emerging from neural, bodily and environmental dynamics; De Jaegher, Di Paulo, 2007, p. 3). An autonomous cognitive system inherently depends on exchanges with the world, which involves the creation of meaning or *sense-making*. As such information from the environment is not passively received or enriched with meaning through internal representations. Rather sense-making, involves enacting or "bringing forth" a world, a process grounded in the biological organization of the organism (Varela et al.,, 1991). Much like affordances and effectivities, sense-making is the outcome of the encounter between a "questioning" agent with a particular "responding" segment of the world (De Jaegher & Di Paulo, 2007, p. 5). The

process of sense-making is thus the outcome of lawful variations which occur during such active (social) encounters. De Jaegher & Di Paulo (2007) understand social interaction as participatory sense-making which refers to the "coordination of intentional activity in interaction, affecting individual sense-making processes which provide new domains of *social* sense-making which were initially not available to the individual" (De Jaegher & Di Paulo, 2007, p. 13). Importantly, for a coordination to be social it must involve an agent that sustains the encounter by maintaining patterns of coordination and whilst at same time remaining autonomous as an interactor. Thus in elaboration to the notion of an O-O-E system it is suggested that although a social system can enjoy unity it can only be sustained when both individuals participate in this unity. A straightforward implication of this claim is that when coordination between two individuals is controlled by only one individual, the system ceases to be social (e.g., in violent situations).

5.1 Enactivism as a Research Program

Arguably, the Enactivist' research program for social cognition is still underdeveloped compared with Embodied Simulation. It has put forward some potentially innovative proposals (e.g., *Neurophenomenology*; Varela et al., 1991; ch. 6; Colombetti, 2013; Gallagher, 2005) but these await wider implementation. Studies on social cognition that have been conducted explicitly under the Enactivist banner involve modeling studies (e.g., Froese & Di Paolo, 2010) and experimental research (e.g., Auvray, Lenay, & Stewart, 2009) that focus on the cognitive consequences of social *interaction* (for experimental results and overviews congenial with Enactivism see e.g., Barhami et al.2010; Fusaroli, Rączaszek-Leonardi, & Tylén, 2014; Schilbach et al., 2013). For example, Auvray and collegeaus (2009) employed a paradigm wherein blind-folded dyads need to detect each other's presence in a virtual space through tactile perception. It was shown that the way dyads detect social presence in this task

could not be explained by individual information processing alone, but is rather explained by movement dynamics that are expressed on a dyadic level (for details see Auvray et al., 2009).

5.2. Second-person versus Third person: a paradigm change

Overgaard and Michael (2013) recently voiced a critique to social interactionism, and questioned whether it contributes much to the explanation of social cognition, either by providing a new kind of explanation, or by changing the explanandum. They claim that interactionism in so far as it is anywhere plausible, is already compatible with existing research, and interaction does not replace individual mental processes that traditional research focuses on. However, in our opinion, replacing the classical notion of mindreading by interaction amounts to a paradigm change. Overgaard and Michael couched their analysis in representationalist language; they construe social cognition as attributing mental states to another person (p.3), mindreading is understanding others as having mental states of various sorts (p. 2), et cetera. Obviously, the domain of investigation is defined here in individualist, representationalist terms. The social cogniser has a "detached" "spectatorial" third- person attitude towards another agent. In contrast a genuine interactionist "second-person" (Gallagher, 2008) approach involves an irreducibly collective mode, a new dynamic emergent pattern extended in time. This is not so much a change in explanandum, as a new way of looking at social cognition, a paradigm change. Instead of mindreading in the sense of inferring or simulating cognitive and emotional states in the other's mind, we seesmooth coping in a new emergent dyadic interactive system, without explicit deliberative thought. When Overgaard and Michael demand (p. 8): "an account is needed *how* interaction contributes to mindreading" (italics in original), the answer might be that social cognition is not about mindreading (at least not in social *interaction*).

6. Final discussion

We discussed how Cartesian and Heideggerian philosophical ideas fit with, and aid in the contrast of, radical Situated/Embodied approaches and the more conservative Embodied Simulation account popular in Social Psychology today. Next we provide a very brief summary of our analysis and its implication for Social Psychology, as to conclude with possible directions for integration of the frameworks presented here.

We have argued that Ecological Psychology and Enactivism are an important extension of the Heideggerian framework. In particular, they provide an account of the temporally extended, interactive unfolding of social cognition. Through embodied know-how, unfolding in ongoing social interaction, we gain a more direct and non-inferential access to the (social) world; the social world as ready-to-hand. Across the radical Situated/Embodied perspectives it is held that the study of social cognition requires a system-level (dyadic) approach.

It is precisely in the interactive context where we have questioned the scope of simulation processes as employed in Barsalou's PSS account. Social Psychology might be hampered by this semi-Cartesian framework, in that the role of actual real-time embodiment is downplayed when ignoring the temporal richness of dynamic social interaction (see section 3). Thus the choice of its explananda are narrowed to (internal) representational states of mind (neural sensori-motor simulations) and the social situation is intellectually construed (as social cognition as individual mental representation), at the expense of successfully accounting for phenomena in dyadic smooth interaction.

Notwithstanding the valuable lesson for Social Psychology to reincorporate smooth dyadic interaction into its *explananda*, we are currently left with a problematic dualism that hampers development of a more unified Situated/Embodied Social Psychology. That is, a strict division between off-line (decoupled) and on-line (coupled) social cognition (de Bruin

& Kästner, 2011). When exclusively focusing on 'embodied social know-how' radical Situated/Embodied Cognition runs in danger to explain away capabilities that are employed in the absence of rich information made available in dynamic social interaction. To date most if not all accounts of social cognitive phenomena are susceptible to some extent to a dogmatic overemphasis of either coupled or decoupled cognitive engagements (De Bruin & Kästner, 2012). The task of working out a coherent and plausible intermediate position, integrating both perspectives is a daunting one, and we can only suggest some directions.

Integrating Cartesian and Heideggerian approaches? Some possible directions

The embodied simulation account and more radical situated/embodied approaches such as Enactivism seem to address different segments of the full gamut of social cognition. Before any attempt can be made to integrate these perspectives, we should appreciate that these frameworks are not simply complementary. Within the Heideggerian framework, smooth coping is the primary epistemic mode, internal representations are secondary. We think a proper study of the social mind should start with investigating it in its natural and ontogenetically primary situation, namely a situated and embodied context. Higher-order forms of cognition are derived, in a bottom-up fashion, by incorporating the linguistically mediated and cultural scaffolding that enable representation, abstraction, and complex recoding (cf. Clark, 2008). As such Barsalou's embodied simulation in its current form seems to lack the proper founding or "grounding" in natural and ontogenetic primary situations.

Hutto and Myin (2013) expressly address the radical variety of Enactivism, replacing the view of mind as a container of mental representations (mental content) by a view of mind as capabilities. For basic cognition no mental content is needed, just adaptive flexibility in coping with the world. Presumably, for forms of higher order cognition, including explicit theorizing on other people's beliefs and intentions, mental content may be a useful

explanation. Hutto and Myin (2013) recognize a "scaffolded" mind, as a kind of language mediated superstructure on basic enactive cognition.

Although Hutto and Myin (2013) do not give a satisfactory explanation of the nature of non-basic cognition, we think there are currently several interesting perspectives that might aid in the development thereof (e.g., Clark, 2008; Fusaroli, Gangopadhyay, & Tylén, 2013). Such accounts posit that 'languaging' consists of actively *using* material symbols, that is, external props with particular physical qualities that augment basic cognition. These accounts expressly incorporate the role of dynamic emergence of cultural practices, the use of external tools and props (including language), and how this offers the human agent means for decoupling and internalization. Interestingly, some of these accounts that fit in this line of thought do incorporate mechanisms akin to Barsalou's sensori-motor simulation (Borghi & Binkofski, 2014).

In closing, let us consider the following promising statement by Barsalou: "One prediction is that cognitive science will increasingly witness the integration of three major perspectives—classic symbolic architectures, statistical/dynamical systems, and grounded cognition—with competition between them decreasing (Barsalou, 2010, p 720)". We agree and to this end we have attempted to broaden the discourse in ESP by introducing radical competitors of Situated/Embodied Cognition to ESP and provided an overview of how such a competition might look like and what it implicates for theory and research in the field.

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