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Abstract	In this paper, we argue that the intentionality at play in skilled performance is not only inherently normative but also inherently affective. We take a radically embodied approach to the mind in which we conceive of cognitive agents as sensorimotor systems moved to maintain their biological and sociocultural identity, whose perception is direct and occurs in terms of affordances. Within this framework, we define skilled performance as the enactment of action and perception patterns in which the agent is intentionally	

oriented towards specific features in the environment. We propose that (i) skillful intentionality is guided by normative constraints involving the material and social conditions of the agent but is ultimately determined by the intrinsic purpose of maintaining the agent's identity, and (ii) skilled intentionality is inherently affective because it is a specific occurrence arising from a general sense of care to maintain one's identity which is realized by orienting oneself towards the right aspects of the environment in the right way. Skilled performance thus requires agents to establish a normative and affective intentionality towards aspects of their material environment. We show that, since sociocultural practices shape human identities, sociocultural practices play a crucial role in shaping human intentionality of skilled performance both in their normative and affective dimensions. Maintaining a human identity, we argue, amounts to routinely carrying out activities that form a historical pattern which is shared with and recognized by others.

Keywords (separated by '-')	Skilled performance - Affective intentionality - Normativity - Enactivism - Ecological psychology
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The affective and normative intentionality of skilled performance: a radical embodied approach

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Abstract

In this paper, we argue that the intentionality at play in skilled performance is not only inherently normative but also inherently affective. We take a radically embodied approach to the mind in which we conceive of cognitive agents as sensorimotor systems moved to maintain their biological and sociocultural identity, whose perception is direct and occurs in terms of affordances. Within this framework, we define skilled performance as the enactment of action and perception patterns in which the agent is intentionally oriented towards specific features in the environment. We propose that (i) skillful intentionality is guided by normative constraints involving the material and social conditions of the agent but is ultimately determined by the intrinsic purpose of maintaining the agent's identity, and (ii) skilled intentionality is inherently affective because it is a specific occurrence arising from a general sense of care to maintain one's identity which is realized by orienting oneself towards the right aspects of the environment in the right way. Skilled performance thus requires agents to establish a normative and affective intentionality towards aspects of their material environment. We show that, since sociocultural practices shape human identities, sociocultural practices play a crucial role in shaping human intentionality of skilled performance both in their normative and affective dimensions. Maintaining a human identity, we argue, amounts to routinely carrying out activities that form a historical pattern which is shared with and recognized by others.

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29 1 Introduction

30 Elite sportspersons, professional musicians, and dancers performing their respec-
31 tive skills; a student changing her posture to avoid pain; and an animal hunting its
32 prey are all examples of skilled performance. Skilled performance, like deliberate
33 action, is a goal-oriented and motivated behavior that is correct according to the
34 norms of an activity, and as such, it can be considered a kind of mental phenome-
35 non. But, unlike deliberate action and like automatic reflexes, these performances
36 do not require explicit reasoning and appear as immediate responses to events in
37 the environment. Skilled performance initiates, among other things, the concep-
38 tual challenge of how to understand the intentionality it exhibits, which in turn
39 raises the question of how to understand agents' capacity to attune to the right
40 aspects of the environment and how they are motivated to do so. In this paper,
41 we aim to tackle this conceptual challenge and offer a conception of intentional-
42 ity that ties together normativity and affection. We propose to understand skilled
43 intentionality as a relation a living body establishes with its environment that is
44 both motivated and regulated by the agent's intrinsic purpose of maintaining its
45 forms of life.

46 We start from a hybrid theoretical framework in which, on one hand, in line with
47 ecological psychology we understand basic cognition as perception of and engage-
48 ment with affordances, that is, aspects of the environment that offer the agent an
49 opportunity to act according to its abilities; following enactivism on the other hand,
50 we understand such engagements as complex patterns of coordination between per-
51 ception and action guided by the agent's intrinsic purpose of maintaining its form of
52 life. Within this hybrid framework, we understand skilled performance as the enact-
53 ment of a sufficiently sedimented network of sensorimotor patterns of interaction
54 with affordances. More concretely, we propose to understand skillful intentionality
55 as an orientation towards the world intrinsically affective and normatively guided by
56 agents' intrinsic purpose of maintaining their forms of life, which for humans are
57 constituted by their biology, society, and culture.

58 We adopt this anti-representational framework, because representations cannot
59 capture the centrality of the agent-environment interaction in skilled performance.
60 Even Millikan's conception of representations (1995) or Wheeler's action-oriented
61 representations (2005) are understood only from the agent's perspective and not as
62 the agent-environment system, which is constitutive of a skill. In other words, and
63 following Baggs et al., "skills arise always through situated engagement with an
64 environment. Bodily change should, therefore, be understood as bodily-change-rel-
65 ative-to-an-environment or, even better, as a change in the extended structure of the
66 animal-environment system" (2020, p. 2). This interaction-centered position is fur-
67 ther supported by the extensive use of dynamical systems as a framework to under-
68 stand the mind as an organism-environment system (Port & Van Gelder, 1995) in
69 which, for example, there is empirical evidence of human-tool synergies and inter-
70 personal synergies (Dotov et al., 2017; Gastelum, 2020).

71 Taking a non-representationalist approach, Gallagher, Hutto, Ilundain-Agur-
72 ruza, Kirchhoff, Miyahara and Robertson have recently summarized advances

and open questions with respect to skilled performance as a mindful activity, and have sketched a general research agenda for embodied approaches (Gallagher et al., 2019, p. 10). They identify as an open challenge the question of how to explain rapid reactions to unexpected situations characteristic of skilled performances. This points to the ongoing debate of whether skillful performance is characterized as mindless or minded, and if there is mental content in said activity (Dreyfus, 2002; Pacherie & Mylopoulos, 2020; Stanley & Williamson, 2017). Closer to our purpose, they identify as an open question the role of affectivity and emotions in skilled performance, because traditional ways of understanding emotions either as purely evaluative and content-filled mental states or as purely somatic reactions are unable to explain how an emotion can influence skilled performances, e.g., anger affecting the performance of a tennis player (Gallagher et al., 2019, p. 2). The conception of intentionality that we propose in this paper is a first step in answering this question: we claim that affectivity plays a constitutive role in skilled intentionality and in agents' ability to follow the normative constraints of an activity.

Our proposed account of intentionality allows us to draft an explanation of why agents orient themselves towards specific aspects of the environment over others: they are normative and affectively moved by them. In the next section, we begin by laying down the theoretical foundations of cognition using both enactivism and affordances 2.0 proposed by Chemero (2009); based on these, we offer a working definition of skilled performance as the enactment of a network of sensorimotor schemes in an *umwelt*. In the third section, we argue that the intentionality at play in skilled performance is inherently affective because of the very constitution of cognitive agents as systems that intrinsically care about preserving their identity which we define as their forms of life; this intrinsic purpose also establishes the foundational normative criteria that guide the agent's interactions with its environment. Identities defined as forms of life comprise at least three levels: a biological/metabolic level in which maintaining one's identity is maintaining oneself alive as an organism, a second level defined by the patterns of sensation and action that allow the agent to interact with its environment, and a third level defined by the shared patterns of activities that human beings share within their sociocultural practices. Based on the sociocultural dimension of identity, in the fourth section, we expand on how sociocultural practices shape skilled performance, normativity, and affective intentionality for humans. We show that agents' skillful intentionality is social because human agents' way of living is constituted by activities that belong to sociocultural practices. Therefore, skillful intentionality is affective because belonging to a social practice means being affectively moved in the right ways according to the practice. Concisely, we show that sociocultural practices nest actions of individual agents in patterns that constitute their individual and sociocultural identities. When agents skillfully interact with their sociocultural environment, they are maintaining the pattern of activities that constitutes their individual identities, and they are intrinsically moved to do so according to the opportunities in the specific situation.

2 Affordances and sensorimotor schemes

2.1 Enactivism: affectivity and sensorimotor schemes

The enactive approach to cognition defines cognitive agents as autonomous and adaptive systems capable of making sense of their environment. Being autonomous means that the agent constitutes its own identity, which includes both its physical boundaries and its internal organization, and maintains this identity under a constant threat of decay. Enactivism defends that autonomy grants the agent with a basic normativity: Interactions with the environment are good as long as they allow the agent to continue existing and are bad as long as they threaten its existence (Di Paolo et al., 2017; Moreno & Mossio, 2015; Thompson, 2007; Weber & Varela, 2002). Although establishing normativity is necessary, it is not sufficient for an agent to make sense of its interactions. Cognitive agents should also be able to monitor and regulate whether they are approaching or receding from their boundaries of viability, that is, whether they are entering into an increasingly threatening situation or getting away from it. This capacity is known as adaptivity, and it allows meaning to be constituted for an agent in terms of how its interactions situate itself with respect to its own boundaries of viability. In short, autonomy and adaptivity together allow the agent to interact with the environment in terms of self-preservation; this way of relating with the environment is known as sense-making (Di Paolo, 2005). A cognitive agent, thus defined, intrinsically cares about maintaining its own form of life and, as its interactions with the environment affect that intrinsic purpose, it is not indifferent to how such interactions unfold. Therefore, a cognitive agent is intrinsically an affective agent (Colombetti, 2013; Thompson, 2007).

The enactive definition of cognitive agents has been refined to account for complex organisms with a nervous system. According to Di Paolo et al. (2017), such organisms interact with their environment by means of sensorimotor schemes which are defined as “reusable interlocking, organized sets of coordination patterns between body and environment” (2017, p. 81). These patterns allow the organism to perceive and act by coordinating its movements with the environment. There are two elements in their definition that we would like to highlight. First, the concept of sensorimotor scheme aims to capture the fact that the organized patterns of behavior of an individual depend on its history, and these patterns are themselves how the agent meaningfully and skillfully engages with the world. Thus, the notion of sensorimotor schemes and the networks they form aim to be agent-centered, history-dependent and able to capture the personal level phenomena (Di Paolo et al., 2017, p. 58).

Second, sensorimotor schemes are normative. According to Di Paolo et al., “the development or acquisition of a sensorimotor (SM) scheme describes how an agent becomes attuned to a specific situation, by selecting and modulating SM coordination patterns in accordance with relevant norms” (2017, p. 58). The relevant norms are established by at least three factors. First, by what a specific sensorimotor scheme demands from the environment and from the agent in order to

161 be executed. Second, by how a particular scheme relates to other schemes so that
162 the agent is able to perform an activity. Consider the following example: coordi-
163 nating in the right time and order while pushing the left pedal, pushing the right
164 pedal, balancing one's body, pressing the handlebars, etc. This is a sensorimotor
165 coordination that, when organized appropriately into a scheme, allows the agent
166 to ride a bicycle. In turn, riding the bicycle belongs to a larger series of activ-
167 ities that allow the agent, for example, to go to work. Carrying out a specific
168 activity, e.g., going to work, exerts a top-down normative force over the temporal
169 organization and selection of smaller activities such as cycling, and of particular
170 sensorimotor schemes like pushing pedals, pressing handlebars, etc., and these
171 activities and schemes have, in turn, their own normative conditions of how they
172 should be carried out in a specific situation.

173 There is, moreover, a third source of normative force: carrying out a specific
174 activity is itself subjected to normative conditions insofar as it helps to maintain
175 the agent's form of life or goes against it. An agent's form of life comprises both
176 its biological identity as a living organism as well as the patterns of activities that
177 constitute its daily life; thus, carrying out a specific activity should allow the agent
178 not only to continue being alive but also to continue being the capable agent it is and
179 the person it is. The normativity implied by the organismic need to maintain its life
180 in a healthy condition is relatively straightforward: agents have to eat, drink, rest,
181 etc., every day to stay alive. However, human forms of life¹ are constituted by much
182 more than what we require biologically: our identity is constituted by the patterns
183 that our daily activities form. These patterns of activities, understood as networks of
184 sensorimotor schemes sketched above, allow an individual to carry out the activities
185 implied by living as, say, a photographer, a mother, a professor, a grumpy person,
186 a woman, a cyclist, etc. These aspects of an agent's identity, i.e., sensorimotor and
187 socioculturally shaped aspects, exist as long as the agent routinely carries out these
188 kinds of activities. Thus, carrying out an activity in a certain situation can be correct
189 or incorrect, appropriate or inappropriate, etc., with respect to whether it contrib-
190 utes to a certain aspect of an agent's identity or not. Since agents intrinsically care
191 about maintaining their own form of life, they are moved to carry out one activity or
192 another in a situation because they see it as a way of maintaining an aspect of their
193 identity. In other words, when an agent is compelled and overtly carries out an activ-
194 ity in a situation, it does so because it is not indifferent to how the situation relates to
195 who it is. In short, carrying out an activity is an embodied normative assessment of
196 what is required to maintain one's identity.

197 Consider the example of a cyclist: while cycling to go to work there are aspects
198 that belong to the skilled performance that go beyond maintaining the agent's bio-
199 logical identity and involve sociocultural normativities, such as following the traf-
200 fic signs or respecting the people on the sidewalk. These are factors that are within
201 sociocultural norms that shape the agent's sociocultural identity, i.e., attending to
202 people in the sidewalk not only because she cares about her own identity but also

¹ This applies not only to humans, but to any form of life whose patterns of interaction are relatively uncoupled from the metabolic needs of the organism.

because she cares about others' safety. All these concerns coexist simultaneously in a skilled performance and maintain her identity as a good citizen, as a safe cyclist, as a responsible adult and so on.

Maintaining one's identity plays a central role in our argument: skillful performances are inherently affective because they are normatively motivated by the agent's most fundamental concern, namely, maintaining its own identity. This makes the conception of identity crucial for our conception of skilled performance. We identify at least three intertwined layers that constitute human identities. The most basic and fundamental identity of an agent is its biological identity which is maintained by its metabolic activity. Second, we identify the sensorimotor identity which consist of the agent's abilities to interact with specific aspects of the environment in specific ways. Like the organismic/metabolic identity, the sensorimotor identity has to be maintained, to a large extent²: sensorimotor abilities such as grabbing and jumping and walking have to be frequently enacted in order to keep being part of what the agent is and can do. The third layer of agents' identities is constituted by sociocultural factors which will be the central point in Sect. 4. There we show that human identities are socioculturally constituted and therefore their activities are motivated, to a large extent, by agents' fundamental concern of maintaining its socioculturally shaped form of life.

2.2 Affordances as dynamic relations: two levels of description

In ecological psychology, perception and action are understood as intertwined cognitive processes that are not mediated by representations, and both are understood through perceiving information about affordances. Information and affordances have been a topic of debate within ecological psychology (see Chemero (2009); Heras-Escribano (2019) for details). We will not delve into the details of this particular debate, but rather simply sketch out our adopted posture.

We take affordances 2.0, proposed by Chemero (2009), as our key conception of affordances because it recognizes their dynamic and temporal character. For Chemero, affordances are "relations between the abilities to perceive and act on the features of the environment" (2009, p. 150). In his conception, affordances and abilities "are not just defined in terms of one another as in the dispositional and relational views... but causally interact in real time and are causally dependent on one another" (Chemero, 2009, pp. 151–152). Affordances interact in real time among each other and, in that sense, they dynamically couple with the rest of the environment. So, if the temporal dimension of affordances is taken seriously, affordances should be characterized in terms of dynamical agent-environment systems, with abilities and aspects of the environment understood as constraints on the potential trajectories of such systems (Gastelum, 2020, p. 2).

² It seems that not all sensorimotor schemes need to be frequently enacted in order to be maintained. For example, schemes that support activities that once were frequently enacted, such as riding a bicycle or dancing, might not disappear after years of not enacting them (Di Paolo et al., 2017). The variation between schemes in regard their durability through time is an open question.

Ecological information has also been widely discussed. Michaels and Carello (1981, p. 37) defend that ecological information serves a dual role. On one hand, it serves to convey structural features of the environment to the animal, which means that information *about* the environment goes from the environment to the animal. On the other hand, information serves to guide the animal in its active exploration of the environment, which means that the animal gathers information *for* guiding its own action. Thus, in Baggs and Chemero's words, "[i]nformation points both ways [the environment and the animal]: we must acknowledge that there is both information-about the environment, and information-for the animal" (Baggs & Chemero, 2018, pp. 9–10).

Ecological information can be defined in different ways. One approach is proposed by Turvey et al. (1981) as lawful information, which establishes perception as a 1:1 relation between aspects of the environment such as energy arrays that form patterns in sound, light, etc., and what the animal perceives (Turvey et al., 1981, p. 245). But Bruineberg et al. (2019) along with Chemero (2009) appeal for a different approach regarding information using Barwise and Perry's situation semantics, because it opens up possibilities for what information can be:

General ecological information is any regularity in the ecological niche between aspects of the environment, x and y , such that the occurrence of aspect x makes the occurrence of aspect y likely. Because of the regular relation between the aspects of the (sociomaterial) environment x and y , general ecological information allows an animal to couple to a distal (i.e., not sensorily present) aspect of the sociomaterial environment (Bruineberg et al., 2019, p. 5237)

So, information can be understood as the way aspects of the environment tend to occur together, which are also called invariances. Moreover, as affordances 2.0 are relations between the abilities of the agent and aspects of the environment, the abilities of the animal depend on the adaptivity it possesses to couple with the invariances of the environment. Therefore, affordances can be defined at the level of the individual as information about the environment that becomes available to the individual according to its abilities and histories of interaction, i.e., information-for, following Baggs and Chemero's terms.

While affordances can exist independently of an individual subject that perceives or engages with it, they cannot exist as independent properties of the physical world. Affordances exist as long as there is a form of life that has the relevant abilities and dispositions to engage with them. In this sense, Baggs and Chemero propose to distinguish between "(1) the environment as a set of resources for a typical, or ideal, member of a species, which we call the *habitat*, and (2) the environment as the meaningful, lived surroundings of a given individual, which we call the *umwelt*" (2018, p. 6).

The distinction between *habitat* and *umwelt* allows us to distinguish (i) the individual's set of affordances given its biological setup, its development, and its individual history (*umwelt*) from (ii) the general set of affordances that are possible for a group of individuals that share a form of life (*habitat*). Jakob von Uexküll proposes the concept of *umwelt* to capture the world that an organism inhabits and experiences

throughout its life. This world arises as the organism with its physiological needs and possibilities establishes functional patterns of perception and action to interact with its environment (Baggs & Chemero, 2018; Feiten, 2020; von Uexküll, 1926, 1957). Given these definitions, the *umwelt* is part of the habitat, and this, in turn, is part of the physical world. This distinction coincides with the two different notions of ecological information discussed above. First, a habitat, as it is available for a species, coincides with the information-*about* affordances, and they both are defined in terms of an abstract relation between the environment and an ideal organism. This definition is further operationalized as the invariances and energy arrays that exist in the habitat that are available to a given organism of a species. Second, an *umwelt*, as it is available for an individual agent, coincides with information-*for*, and they both tell us how the structure of invariances and energy arrays enters into the directed activity of a living animal (Baggs & Chemero, 2018, p. 10). The specific abilities of an agent allow it to perceive certain invariances in the environment as affordances; the invariances become information-*for* as they are actually perceived as invitations to act, therefore what an individual agent actually perceives is relative to its particular set of abilities to act. This distinction will allow us to characterize the intentionality of skillful engagement in a particular habitat in terms of affectivity in the fourth section.

It is important to note, that in the perception and learning of affordances, as they are understood as *information for* an agent, there are also values involved:

[A]n affordance is a real possibility to make a difference, however small or large, along the way going through life, and we perceive the world in those terms... Even though the relative importance of individual choices may vary, the difference to be made always fits somewhere along the spectrum of avoiding negative and seeking out positive outcomes. In this sense, an affordance is always a realization of value (Hodges, 2007). (Szokolszky, Read, Palatinus, & Palatinus, 2019, p. 5)

Following the enactive approach, value, i.e., what is negative and what is positive, emerges with respect to an individual who, by virtue of its own organization, is driven to perceive and act in an environment to maintain its precarious form of life. This amounts to normativity at the core of the cognitive agent constitution, and which, we will argue in Sect. 3, is intrinsic to affordances and inherently affective.

2.3 Converging affordances and sensorimotor schemes in skilled performance

The affordance 2.0 conception converges with the enactive account of cognition as based on a set of embodied skills and abilities that is the product of a history of interactions with the environment mastered over time. Here is why: According to the enactive approach, sensorimotor agency arises when sensorimotor habits are developed, repeated, and acquired as repertoires, that is, when the sensorimotor regularities of movements and sensations are mastered. These habits organize into autonomous networks that include the bodily and environmental structures that allow the agent to carry out activities (Di Paolo et al., 2017). The relation between the body

and the environment established within networks of sensorimotor schemes is analogous to the relation between a skillful agent and a given affordance in specific habitats. On one hand, environmental structures that belong to networks of sensorimotor schemes invite the agent to enact the bodily patterns of behavior available to it, that is, they are affordances for the agent to enact a particular network of sensorimotor schemes in a specific habitat. On the other hand, being able to establish a network of patterns of bodily behavior in the appropriate environmental circumstances implies developing or having the skill to recognize an affordance and to engage with it. This means, just as with skillful engagement with affordances, that the agent should follow the normativity imposed by the sociomateriality of the situation (what to pay attention to, how to engage with that, etc.), and so do networks of sensorimotor schemes, at least at the level of the sensorimotor agent. In short, both affordances and sensorimotor schemes capture the relation between a skillful agent and its world, and they both capture the normativity implied in this relationship.

In this framework, we define a skilled performance as the carrying out of a network of sensorimotor schemes that has conditions of success and failure, and where the agent is oriented towards aspects of the environment that it perceives as affordances allowing it to act according to its purposes. We argue that in this execution, the agent is intentionally oriented towards aspects of its world that are relevant to its performance and, ultimately, to the maintenance of its identity: skilled intentional orientation is itself an embodied normative assessment of how an action in a specific situation is relevant for an agent's sensorimotor and sociocultural identity. This assessment is the feeling that something must be done in this specific circumstance, a lack of indifference of how the situation matters to oneself, rather than an explicit or propositional judgment of an agent about a situation. In other words, the skilled intentional orientation of an agent towards the world is itself a felt and embodied normative evaluation of how a situation matters to its identity.

Skilled performance implies caring about performing an action in a right manner, that means, caring about the right aspects of the environment, in the right way and in the right circumstances. Agents care about these elements or about performing an action because either they are moved by the dedication to maintain their own identities, e.g., cycling to maintain one's identity as a cyclist, or because the performance brings convenient pragmatic consequences to them, that is, it allows an agent to do something else, e.g., cycling to work or losing weight. But, we argue, even when agents are moved by pragmatic goals, their skilled performances are ultimately motivated by the maintenance of their own identities. Thus, we show that all cases of skilled performance involve caring about one's identity by showing that this is the case even in cases in which agents are moved by pragmatic goals.

Skilled performances that are moved by pragmatic goals are a series of interactions with the environment that unfold in time that are structured by the overall goal of achieving something, say, going to work or losing weight. In other words, these instrumental skilled performances are meaningful to an agent in terms of its practical consequences. Such practical consequences, external to the skilled performance itself, are what moves the agent to act, that is, they serve as her affective motivation. Although it could be sufficient in some contexts to explain skilled performances in terms of their instrumentality or their intrinsic value for the agent's identity, one can

further wonder why these pragmatics goals serve as an affective motivation so that they effectively move the agent to act.

Enactivism allows us to explain precisely this point: pragmatic goals are affectively motivating for an agent because, as we argued in Sect. 2.1, they are relevant to the maintenance of their identity with respect to any of the layers of identity we identified there: organismic, sensorimotor and sociocultural. As we will argue in Sect. 4, human identity is constituted by the patterns of activities that make up their daily life –these activities crucially include the use of language and the interaction with others–. Each of these patterns constitutes an aspect of her identity or, as Varela (1991) calls them, micro-identities, and all these patterns together constitute who the agent is. For our examples, this means that the daily life of the dedicated cyclist would often include cycling around with no other purpose than cycling itself, whereas for the other two cases, if there is no need to go to work or no perceived necessity of losing weight, the agent would not cycle. Moreover, the dedicated cyclist would perform other actions such as saving money for a faster bicycle, joining a club for cycling together with other enthusiasts, etc., while if the purpose of cycling is instrumental, e.g., to lose weight, the agent would talk about this purpose with others, google other strategies to lose weight, be self-conscious about what they eat, etc. Crucially, being a cyclist or wanting to lose weight consist in the pattern that these respective actions conform together; and in virtue of the pattern of activities that they belong to they have a significance for the agent. In that sense, skilled performances contribute in one way or another to an aspect of the identity of an agent, that is, a pattern of activities that make up her form of life, and that is the very reason why agents are motivated to engage in such performances. Thus, we can conclude that even when skilled performances are instrumental, skilled performances are both motivated and regulated by the agent's intrinsic purpose of maintaining its form of life.

In Sects. 3 and 4, we will expand on the affective dimension of intentionality and in the sociocultural shaping of the normativity proper to skilled intentionality, respectively. Before that, there are three points that we want to clarify to characterize skillful intentionality. First, the intentionality of skilled performance occurs at the level of the *umwelt*. Second, the identity that human cognitive agents are intrinsically driven to maintain is a form of life constituted by socioculturally shaped and shared activities. Third, skillful intentionality is a property of a tight coupling of the agent with its environment characterized by a sense of efficacy and familiarity.

2.4 Intentionality occurs at the level of the *umwelt*

The enactive account of the agent-environment interaction focuses on one of the possible levels of description that ecological psychology encompasses: the level of the agent. As we have explained above, the environment can be described in two ways: First, as a habitat which captures the affordances available to a form of life shared by a species or a community; and second, as an *umwelt* which refers to the affordances available to a particular individual given its own set of skills and the activities that constitute its particular form of life. The enaction of a network of

sensorimotor schemes precisely describes the latter level from the perspective of an agent. According to the enactive account, a cognitive agent skillfully interacts with its environment by being moved to carry out the activities required to maintain its form of life in a particular situation.

As we explained above, the conformation of networks of sensorimotor schemes requires the agent to master certain regularities of the action-perception loop formed by its interaction with the environment in order to preserve its boundaries of viability, or to carry out a particular activity, and ultimately to maintain the pattern of activities that constitute its form of life. It should be noted that this mastering does not require explicit knowledge of sensorimotor regularities, but it refers to the embodied ability to carry them out when the situation calls for it. Then, mastering sensorimotor schemes implies that the agent becomes sensitive, on a personal level, to aspects of the habitat that allow it to carry out activities that are relevant to it, either as part of executing a more complex activity or as a way of directly maintaining its form of life. This means that the agent is able to tune in with specific invariances available in a habitat, i.e., certain information *about* such an environment, and to interact with them such that they become information *for it* (*umwelt*). We believe that this convergence fleshes out what Baggs and Chemero have rightly noted: “The ecological account of external structure is compatible with the enactivist account of the internal organization of the animal. Life happens in the dialectical confrontation of the two” (2018, p. 14). One nice example of this is the role that play has during ontogeny, according to Pelligri et al.: “children sample their environment and through play learn and practice behaviors adaptive to that environment” (Pellegrini et al., 2007, p. 263). This means that, through play children access information about the environment and transform it into information for their own activities that help them build their identity as part of their development.

2.5 Socioculturally shaped human identities and intrinsic normativity

Human identities are fundamentally shaped by the activities that fill their daily lives. Thus, the normativity of human skilled performances depends on whether or not they fit in the pattern of activities that consist an agent’s form of life, e.g., working, commuting, preparing meals, spending time with one’s family, etc. In line with enactivism, normativity arises in nature with the self-constitution of precarious individuals, i.e., living creatures. A living organism has the intrinsic purpose of keeping itself alive, and it thus has a point of view from which the world is evaluated in terms of this purpose. This extremely basic form of normativity gains complexity as forms of life gain complexity, which occurs in shared forms of life in which normative criteria are socially constituted. In the case of humans, maintaining one’s identity not only implies sustaining one’s organismic life, but also maintaining the patterns of activities shared with others that comprise one’s daily life. In human activities, the normative distinctions between acting right or wrong, being successful or failing, etc., are ultimately determined by whether an action continues or breaks the pattern of activities that others carry out and whether or not it is recognizable by other members of the shared form of life (Schatzki, 1996). Thus, human activities

and their normative conditions must be learnt in repeated interactions with others in a specific sociomaterial environment, and they become part of the agent's identity when they are routinely carried out in a specific practice. For example, maintaining one's identity as a photographer implies routinely taking pictures, being seen as taking pictures rather than pretending to, editing pictures, sharing pictures with or selling them to others, being paid for pictures, etc. Thus, a skilled performance, inasmuch as it is a human activity, and its practical consequences are normatively evaluable not only with respect to the biological viability of the agent, but also with respect to its identity in a specific sociomaterial practice. We develop this point in Sect. 4.

Even though each sociocultural practice has its own normativity, it is important to say that conforming to social norms does not always lead to the right action or the right belief in objective terms. This objectivity is given through material situatedness and the possibilities of each practice, that is, what the material environment potentially allows individuals to do independently of what their beliefs or wishes might entail. This means that despite the social agreement of, say, the earth is flat, the material constraints of the earth preclude the possibility of ever finding the outer border of the earth because it does not exist. Although scientific objectivity (in general) can and has changed depending on the historic trajectory one is looking at, the materiality of the environment in which our practices are situated set objective conditions that condition the correctness of our practices.

2.6 Intentionality from the point of view of the agent

Following Merleau-Ponty, the relationship that an agent establishes with its environment in skilled performance can be described as the tight relation the agent establishes with the objects of its concern in its everyday coping activities, rather than standing back and positing upon them before acting. Importantly, systems of perception build a tight connection between the agent and the world, because, as the agent acquires skills, those skills are "stored" as dispositions with which to respond to the solicitations of situations in the world (Merleau-Ponty, 2012 [1962]). In this characterization of intentionality, content understood as conditions of satisfaction for an action does not play any explicative role (Dreyfus, 2002). We adhere to this position and add that in order to characterize this tight direct relation, it should be recognized that intentionality is as dynamic as the situations in the world are. Affordances interact with each other in time, and thus what appears meaningful to the agent and towards which it orients its actions (the multiple affordances available for a particular organism), i.e., its *umwelt*, has its own temporal dynamics too. For example, when one is cooking, the different tools and ingredients change what they afford as the activity unfolds.

Moreover, an agent's *umwelt* expands as its repertoire of socially acquired sensorimotor schemes expand through the history of its interactions. As sensorimotor networks are mastered, a continuity, a flow in how one scheme leads to the next arises too. This flow comes with a sense of familiarity in which the agent feels at home when acting: its activities are felt as its own life. In the words of Di Paolo et al.,

Much of our caring about what we do and how we relate to the world takes the form of experiencing our efficacy as agents and the place we occupy in our surroundings. For instance, we may experience a feeling of flow in our activities in situations when we are coping skillfully with whatever we are doing, effortlessly enacting well-coordinated movements and switching from one task to the next. (Di Paolo et al., 2017, p. 43)

Acquiring and carrying out networks of sensorimotor schemes requires agents to care about how their interaction unfolds and of certain aspects of their environment and not others; which in turn implies that an *umwelt* is a space of care and concern for an organism. Furthermore, this is why *umwelts* bear information for particular agents. We focus on this element of care in the perception of affordances in the following section and show its role in the intentional relation an agent establishes with aspects of its *umwelt* in skilled performance.

Before we continue, it should be clarified that within the embodied framework we have just sketched, there is no meaningful way of maintaining a qualitative distinction between exclusively human skills, such as sports on one hand and foundational cognitive interactions such as hunting for food on the other. The reason is that in both cases the agent is moved to skillfully interact with the environment because it contributes to preserving its form of life. This means, first, that even basic interactions such as looking for food are normatively guided by the agent's need to maintain its biological identity (Mojica, 2020), and, in that sense, they can be considered as minimal skillful interactions. Second, exclusively human skills are normative with respect to the socially established norms of execution, but they are also normative for the agent to maintain its socioculturally shaped identity: the agent is moved to practice sports because it is moved to maintain its identity as a sportsperson. We expand on this later point in Sect. 4.

3 Affective intentionality in skilled performance

This section has both a clarificatory and an argumentative purpose. As for the clarificatory purpose, we expand on what we mean by affectivity because the element of care and affectivity is part of the central claim of the paper: skilled performance is affectively moved by maintaining one's form of life. As for the argumentative purpose, we argue that skilled performance entails affective intentionality, in other words, that skilled performance is a special case of cognitive interaction in which cognitive agents experience the world in affective terms in relation to their care for their identity. For that, we begin by offering a definition of affectivity as the intrinsic motivation to maintain one's form of life (Sect. 3.1). Then, we offer a conception of skilled performance as a normatively guided agent-environment interaction (Sect. 3.2) which is defined as an interaction subjected to conditions of success and failure that allow the agent to differentiate between an interaction that is right versus an interaction that merely seems right. Based on the enactive approach, we maintain that success and failure, right and wrong, etc. in an interaction is determined by its practical consequences, and these consequences are ultimately determined as

better or worse, convenient or inconvenient, etc. according to the impact they have on the maintenance of the agent's form of life. Thus, interacting in a normative way with the environment means to be affectively moved to maintain one's form of life –this follows from the enactive conception of affectivity and of normativity. Because skilled performances are normative, it follows that skilled performances are interactions with the environment in which the agent is affectively moved by the agent's drive to maintain its form of life.

3.1 Care, affectivity and enactive normativity

Care is the affective dimension of the relation an individual agent establishes with its world. This relation has been captured by Slaby's concept of *affective intentionality*:

While experiencing events or situations as significant, the felt body is resonating in specific ways that disclose the subjective significance of the event perceived. That is what is meant by the terms “being affected”, “moved” or “shaken” by something that thereby reveals its significance to us (Slaby, 2008, p. 435).

Slaby's concept of affective intentionality and, in general, his work in affectivity aims to bring together the insights on emotion from two traditions: analytic philosophy and phenomenology (Slaby, 2008, 2012; Slaby & Wüschner, 2014). On one hand, he takes from the analytic philosophy, in particular from Döring, Goldie and Helm, the conception of emotions and affects as *felt* appraisals; on the other hand, he takes from the phenomenological tradition the conception of affectivity as a form of intentionality that makes the world meaningful to the agent, in particular, from authors like Ratcliffe, Merleau-Ponty and Heidegger.

Enactivism offers a way of further specifying what affect means in this context: The affective character of meaningful agent-environment interactions comes from the agent's drive to maintain its form of life. In Sect. 2.1, we characterized cognitive agents as precarious self-organized and self-maintained systems. We also explained that the need to maintain such a precarious identity is what allows a point of view to arise because interactions are evaluated with respect to what is good or bad for the agent's identity. The evaluations at play in this definition of agency are not neutral or detached. Agents are not indifferent to how the interaction impacts their identity; instead they bodily feel their evaluations and they are moved to act.

This embodied affectivity has been recognized, although sparsely, in the ecological psychology literature. For example, according to Rietveld and Kiverstein, agents undergo physiological changes that allow them to respond to the situation, and these changes are bodily felt as readiness for action (2014, p. 342). It has also been defended that perception and action have inherent affective dimensions. On one hand, since cognitive agents intrinsically care about maintaining their own existence, perception is always value-laden and the environment, when perceived and acted upon, always affects the agent in one way or another (Colombetti, 2013). On the other hand, an agent's reactions to the environment are always moved by its intrinsic motivation to affirm its identity. To use Sheets-Johnstone's

expression, agents are *moved to move* (1999), and they are moved by the way in which the environment affects them. In sum, engaging with the environment in a meaningful way implies both that agents intrinsically care about how the environment affects them in terms of the maintenance of their form of life and that they are affectively moved to interact with it. It should be noticed that the physiological changes proper of the response to a situation are not exhausted by a linear and causal relation body-environment; instead, they result from the autonomous character of the organism that allows it to self-organize to respond to the situation in accordance to what currently matters to it. In Di Paolo, Cuffari and De Jaegher's words, "the dynamic and intricate entanglement of adaptive, metabolic, physiological, emotional, and intercorporeal dimensions of body existence explains how and why things matter to us" (2018, p. 3).

The embodied nature of the affectivity intrinsic to cognition has been further developed by Fuchs who defends that there are two interconnected affective processes intrinsic to cognitive agency (2018). First, there is a basic sense of self-affection that arises from the embodied processes of vital regulation, such as homeostatic and immune processes, that occur both in the interplay between the brain stem and the rest of the body. According to Fuchs, this basic sense of self-affection comes from the very constitution of the system as a cognitive and living agent; it is felt as being alive in its most general form, and more specifically, can take the shape of the feeling of exhaustion or the feeling of energy, the feeling of being uncomfortable or at ease, etc. (p. 60). It is, in short, the embodied feeling of how one's body is faring. Second, organisms have a basic intrinsic feeling that draws them to interact with the world which Fuchs refers to as *conatus*. In its most basic form, it is what moves organisms to find what is required to keep themselves alive, e.g., the feeling of hunger or sexual drive, which implies that conative processes closely interact with self-affection. Unlike self-affection, conative processes have directionality: they orient the agent towards the world, and they are usually more prominent in agents' experiences than the sometimes more subtle self-affection. Note that conative processes are possible only for organisms that can move in their environments and establish sensorimotor patterns, that is, organisms with dedicated systems for perception and action.

Both self-affection and conative processes are specific manifestations of the intrinsic drive to maintain a form of life that we refer to as *care*: they are both the feeling of how one is faring with respect to the maintenance of one's life—the former with respect to one's organismic life, that is, the state of one's body as a living creature, and the latter with respect to one's sensorimotor life, that is, the state of one's habits of interaction with the world. In short, both are occurrences of the general disposition to care about one's life. Recall that cognitive agents are precarious self-constituted agents who, because of their precariousness, care about maintaining their life and constantly interact with the environment to avoid their own decay. Care is thus a disposition proper to living cognitive agents. It is an openness to interact with what the environment presents in terms of one's own maintenance; it takes the form of specific occurrences, e.g., the feelings of exhaustion, thirst, or fear, as the agent's organismic and sensorimotor skills actualize in the relevant circumstances.

There are two points worth noting with respect to this conception of care for our purposes. First, both dispositional and occurrent forms of care are not discrete states but processes that unfold in time. Just as with any mental process, care can be conceived of as a trajectory in the interaction between the nervous system, the rest of the body, and the environment. These trajectories are defined as processes that unfold in time and would involve, for example, the release of hormones, salivation, attentional disposition, etc., that over time produce the growing feeling of hunger. These interactions may result in an overt action, e.g., looking for food or cooking a meal when hungry, or may not result in an overt action, e.g., ignoring one's hunger for a couple of hours. A crucial element that drives the dynamic interactions in one trajectory over another is the agent's concern, i.e., care, with its self-maintenance in the face of its constant decay, so that care is constantly shaped and actualized depending on what threatens the agent or offers an opportunity to stay alive. These schemes become habits with enough repetition, and when repeated in accordance with the relevant normativity, they become skilled performances; we want to highlight that in this process, a scheme facilitates a certain affectivity for that particular action as it gets mastered.

Second, the conception of care we propose involves as occurrences not only sensations such as hunger and exhaustion, but also emotions, moods, pains, etc. All these phenomena are instances of care because they make manifest aspects of the environment or of the internal dynamics of the agent that are relevant to its self-maintenance as an individual and moves it to act. So, to use Helm's example, one might feel fear of an early frost because it might kill the tomato plantation that one has worked hard to maintain (Helm, 2009) and, we further propose, one cares about the tomato plantation because it is part of what constitutes one's identity: taking care of the plantation shapes certain habits of interaction and a network of activities that constitute what the agent does in its everyday life and, crucially, that is part of who it is (Varela, 1991).

The notion of care as we have just characterized is compatible with the conception of skilled performance from an ecological-enactive approach that we offered in the previous section. Care refers to the dynamic disposition intrinsic to living creatures to be moved to maintain their own forms of life both in their biological, sensorimotor, and sociocultural aspects that take specific shapes as dynamic trajectories in agent-environment interactions. Above, we saw that a skilled performance is the enactment of a network of sensorimotor schemes, and that enacting sensorimotor networks allow agents to carry out the activities required to maintain their identity. Now we can see that carrying out activities is inherently affective for two reasons. First, enacting a network of sensorimotor schemes in some cases directly responds to the most basic organismic needs and transforms the affectivity of the deep body into a world-directed affectivity. This is the case, for example, when exhaustion is transformed into anger directed towards others or when hunger is transformed into the motivation to call for a pizza delivery. Second, when activities do not directly respond to the organismic or deep body's needs, they still involve the affective intentionality of the agent; in other words, enacting a network of sensorimotor schemes is itself a conative process. The reason is that this kind of activity constitutes the life form of the agent, thus, although not immediately required for survival, they

are essential for maintaining the agent's sociocultural identity, as we saw before in Sect. 2 in the cycling example. Therefore, networks organize as they do because the agent cares (not necessarily in a reflexive way) about maintaining its own form of life, and they are enacted because the agent is affected by the situation in a way that calls for the active maintenance of a given form of life. In this sense, from the ecological-enactive perspective, affective intentionality permeates every level of identity that we identified: the organismic, the sensorimotor and the sociocultural.

In addition to this, as we saw in Sect. 2, following the enactive approach, value, i.e., what is negative and what is positive, emerges with respect to an individual who is driven to perceive and act in an environment to maintain its forms of life by virtue of its own organization. Value is thus deeply connected to the needs of the agent. Organismic and sociocultural needs are closely intertwined and mutually codefined in humans: the ways in which we satisfy our most basic needs are always socioculturally shaped—think of our eating, sleeping, or sexual habits—and we suffer from physiological and mental decay when isolated. This interplay can be described as the transformation of self-affection into conation via socioculturally constituted networks of sensorimotor schemes through affordances, and conation can be further understood as the proper intentionality of an agent's sensorimotor schemes in its *umwelt*.

There are at least two implications worth noticing that follow from conceiving networks of sensorimotor schemes as conative processes. First, the relation that agents establish with their *umwelts* is not a neutral relation of detached information processing but an affective one. The affordances towards which they can meaningfully orient themselves are precisely the aspects of the environment that are or can be relevant for maintaining their form of life both in the sociocultural and organismic aspects. Thus, affordances are the actual or potential intentional objects of conation as defined above. Second, the normativity with respect to which agents' sensorimotor interactions are evaluated is their form of life, so following this normativity is intrinsically valuable for cognitive agents.

The concept of form of life is central, as it sets the normative criterion for agents to guide their interactions with others and with the environment and to care about them. In general, an individual's form of life is the pattern of activities it routinely carries out. On the most basic and fundamental level, this comprises the activities that are proper to its organization as a living being which allow it to continuously affirm its identity as the biological organism it is, e.g., eating, breathing, sleeping, etc. All living organisms, from bacteria to human beings, guide their interactions on some basic level according to the normativity that their metabolic needs impose, and bodily feel whether they should change the course of their interactions according to what is favorable to their maintenance. Crucially, organisms bodily feel only what they are able to act upon, so, for example, mammals are moved to find food by the felt hunger, but are unable to bodily feel radioactive damage in an interaction because they lack the mechanisms to counteract it. Thus, interacting in a normative way with the environment means to be affectively moved to maintain one's form of life, or to put it in other words, skilled performance is a special case of cognitive interaction in which cognitive agents experience the world in affective terms in relation to their care for their identity.

3.2 Skilled performance and affective normativity

With the definition of care we offered above, we can show now our main point: the intentionality at play in skilled performance is inherently affective. Skilled performance is an agent-environment interaction that is established and normatively guided by incorporating patterns of sensorimotor interaction from and with others. As it has been modestly recognized in ecological psychology, skilled performance requires the agent to care about the right aspects in the environment and to act on this care in the right way (Rietveld & Kiverstein, 2014). In other words, skilled performance requires the agent to establish the right intentional relation with the right aspects of the environment. For example, playing frisbee requires agents to care about the trajectory of the frisbee, and to act on this care by catching it and throwing it to a teammate –it would be a mistake to care about the potentially harmful viruses and bacteria in the frisbee because it would make playing impossible for the agent. The correctness conditions of skilled intentionality, that is, the right aspects to attend to and the right way of engaging with them, are determined by whether or not they allow the agent to perform an activity.

At this point, enactive theory can explain further why the agent is moved not only to interact with aspects of the environment, but to do it in the right way: Agents fundamentally care about maintaining their forms of life which, given the definition of form of life that we just gave, implies enacting networks of sensorimotor schemes in the specific material and social environment of the agent; that is, carrying out in the right way the activities that comprise its sensorimotor identity. Agents thus are not indifferent and cannot be indifferent when skillfully engaging with an affordance. They are affectively moved towards the world because engaging with the world allows them to maintain their identity. This moves them to monitor and regulate their interactions in accordance with the socially shared patterns of sensorimotor schemes that make up an activity. In short, agents act normatively because they are affectively moved to do so.

To sum up, we propose to conceive skilled performance as an agent-environment interaction in which the agent is intentionally oriented towards the environment; this intentionality has two crucial characteristics, (i) it is guided by normative constraints which involve the material and social conditions of the agent but which are ultimately determined by its intrinsic purpose of maintaining its form of life, and (ii) skilled intentionality is inherently affective because it is a specific occurrence of the general disposition of caring about maintaining one's form of life, and it is realized by caring about the right aspects of the environment in the right way. Skilled performance thus requires agents to establish a normative and affective intentionality towards aspects of their *umwelt*.

It is worth spelling out the notion of normativity at play here. In general, the kind of agent-environment interactions relevant for cognition are normative, that is, they are subjected to conditions of success and failure that allow the agent to differentiate between an interaction that is right versus an interaction that merely seems right. Maintaining a form of life as a goal sets conditions of success and failure because the practical consequences of an agent-environment interaction have concrete practical consequences with respect to its form of life that are independent of what the

situation seems like to the agent (Mojica, 2020). For example, if an octopus eats a poisonous crab, no matter how delicious and good that interaction seems to it, the practical consequences of its illness and possible death allow the octopus to determine whether or not eating the crab was a good interaction or a right assessment of the situation. This basic sense of normativity that lies in the crossroads of biology and cognition becomes more paradigmatically skillful when it gains in complexity and, crucially, in independency from the organism's needs. This is the case when agents are encultured as members of sociocultural practices by which both their skills and their forms of life are shaped. In the next section, we will see in more detail how this is the case. For now, there are three implications of this conception of normativity that we would like to highlight.

First, an agents' history of intersubjective interactions is crucial for the shaping of its skills and *umwelt*. The crucial role of history is obvious in that both development and training are essential for acquiring a skill, and therefore for the shaping of the *umwelt* the agent inhabits. This implies that, for example, a trained musician inhabits an *umwelt* of a rich variety of sounds, notes, harmonies, and rhythms towards which it can affectively and normatively orient itself such as when it can tell that the street performer is singing slightly out of tune and be annoyed by that, while untrained individuals would be indifferent to the subtleties the musician perceives. However, the role of an agent's history of interactions in constituting a skill and its *umwelt* goes even further. The normativity to which skilled performances are subjected is not completely determined by mechanisms internal to the individual agent or what is present in the very moment of the skilled performance, but the agent's history of interactions itself has a normative force. Cases of ultrafast cognition in which agents can correctly recognize the content of complicated pictures in around 300 ms show that agents are physically unable to monitor and regulate each of their interactions with emergent or dedicated mechanisms. These cases suggest that skilled interaction in general cannot be accounted for without understanding interactions extended not only in space but also in time (Mojica & Froese, 2019). This means that what normatively determines whether the agent is caring about or engaging adequately with the right aspects of the environment in the current interaction is partially dependent on whether the agent follows the pattern established by its past interactions, i.e., if it cared about them previously.

Second, the constitutive role of agent's interactions also implies that affordances can be analyzed through time. To start with, abilities and situations in the environment are not the same the first time one engages with them as they are in the second or third, etc. As a consequence, the repetition of the perception of and engagement with affordances has an impact on the affectivity they carry, mostly because of neuronal facilitation and plasticity in the sensorimotor schemes: when one masters an ability, the sensorimotor scheme occurs faster than its initial performances and that *feels good*. Likewise, expectancy and anticipation are transformed which means that one already expects what will happen and knows what the *umwelt* will likely afford. Thus, learning crucially shapes affective normativity.

Third, the normative role of the history of interactions and the affective aspect of skilled performances allow us to better understand why agents are drawn to certain affordances at a specific moment and not at other times: A given affordance is

salient for an agent because it is currently relevant to maintaining its form of life. The agent engages with the affordance because it is threatening or favorable for affirming an aspect of the agent's sensorimotor identity. Moreover, the relevance of such an affordance for the agent's form of life is established by a history of interactions in which the link between a particular activity, say, writing a paper on a cold Sunday afternoon, and a form of life, being an academic, is established so that the former is a form of affirmation of the latter, and there's even a feeling of familiarity or the "being at home" sensation, which has to do with belonging. The link between a certain skilled performance (from walking or eating to playing piano or writing a paper) as a means of affirmation of the identity of the agent is crucial, because it motivates the agent to act as it does in the specific circumstances it is. The reader should recall that one's identity is constituted by the pattern of activities of one's daily life, whether or not one would proudly admit it to oneself and to others. This link of significance between an action and the agent's identity frequently involves a long chain of actions that are instrumental to self-affirmation, as in the example above, cycling to going to work, going to work to finish an abstract to send to a conference, to attend a seminar, to have lunch with colleagues, etc., doing all these activities to maintain one's identity as a member of academic practices. These chains of significance allow agents to maintain their identity through time and thus they give affective value to particular skilled performances in specific circumstances even when the agent is not conscious of these chains.

To sum up, we showed that because skilled performances are enactively normative (Sect. 3.1), it follows that skilled performances are interactions with the environment in which the agent is affectively moved by the agent's drive to maintain its forms of life. Also, it is important to highlight here that all species master some sensorimotor schemes, and it is in their specific habitats that they generate care and affectivity towards particular affordances that serve particular purposes for their forms of life. In the particular case of humans, identity and culture are part of the same interaction loop and that is why Sect. 4 will be dedicated to sociocultural normativity.

4 Sociocultural practices and the normativity of affect

As we have explained in Sect. 2, the general set of affordances that are possible for a group of individuals in a form of life is called a habitat. A habitat comprises all the aspects of the environment towards which the members of a form of life, that is, agents that share the relevant skills to carry out a given activity, can orient themselves. Accordingly, habitats are determined both by the materiality of the environment as well as the skills shared by individuals of a species or of a common sociocultural practice. In this section, we expand on the role that sociocultural practices have in the constitution of forms of life, skills, and habitats.

Rietveld and Kiverstein (2014) originally propose to understand habitats as landscapes of affordances, and affordances, in turn, as aspects of the environment that offer motor possibilities to individuals that share a form of life. Their concept of form of life captures not only biologically given patterns of behavior in humans and

animals, but also the patterns of behavior we humans share within our sociocultural practices. In their words, what is common to humans that share a form of life is “[their] sharing steady ways of living with others, [their] relatively stable ways of going on” (p. 329). Human sociocultural practices vary across social groups; consider, for example, the form of life shared by professional athletes and the one shared by writers. According to Rietveld and Kiverstein, based on Ingold’s argument (2011), “the central difference between these forms of life can be attributed to the embodied skills of practitioners situated in their structured surroundings” (p. 329). We usually belong to various sociocultural practices because we share different patterns of behavior with different groups of people in different material niches, e.g., family, friends, coworkers, etc. Therefore, we understand an agent’s form of life as a set of different sociocultural practices that are frequently enacted by the agent in the appropriate spatiotemporal circumstances.

Forms of life constitute the normativity by which agents make sense of their environment and engage with affordances. As we see above, networks of sensorimotor schemes are enacted because the agent cares about maintaining its form of life which, for human beings, comprises both a biological and a sensorimotor identity. Human sensorimotor identities are crucially shaped by patterns of behavior shared with others. Aspects of the environment thus are significant to an agent as they offer the possibility of maintaining its biological viability, e.g., hydration or nurture; or offer the possibility of belonging to a socially shared practice, e.g., writing a paper as a way to belong to academic practices. Not only do we perceive these aspects of the environment as affordances, we engage with them when they are affectively relevant to us, that is, when we bodily feel the need to maintain a form of life that we value. The sociocultural constitution of human forms of life implies that human individual identities are socioculturally shaped too: human agents are who they are because of what they routinely do which in turn allows others to recognize agents as members of social practices (Schatzki, 1996). For example, being an academic consists in going to university, giving talks and lectures, routinely reading and writing papers and books, sending emails to colleagues and students, attending conferences, etc. It is crucial that the agent is recognized as such by other members of academic practices, students, professors, staff members, university bureaucrats, etc. in their interactions. These actions are threaded together by our academic social practices and they are threaded together in the individual as an agent that belongs to the practice as an academic. In short, sociocultural practices thread together actions of individual agents and constitute their individual identities.

There are two points worth noting. First, the environment we interact with is socioculturally crafted by us to support our form of life. This includes how we arrange our belongings in our personal space to, say, work or rest, and how we build our cities and its public spaces. Second, for humans, the networks of sensorimotor schemes that allow us to keep our biological identity are socioculturally shaped, e.g., what and how we eat and drink depend on the patterns of behavior shared in our culture. We need to learn them during early development and maintain them skillfully throughout our lives in order to survive. Thus, maintaining our human identity, in both biological and sensorimotor aspects, requires us to continue to uphold a set of sociocultural practices by skillfully engaging with our shared habitat.

Elias (2017) gives an account of the sociality of affordances that clarifies what counts as belonging to the shared patterns of human activities. He distinguishes between regulative and constitutive constraints on affordances. While regulative norms operate on preexisting affordances, e.g., using cutlery rather than hands to eat–, constitutive norms engender and create affordances themselves, e.g., chopsticks as a eating utensil for some as a result of their enculturation (p. 251). This distinction, he argues, is a matter of degree, not of kind:

Affordances, then, emerge in virtue of such enculturation and cultivation. So the distinction, again, is between regulative norms operating on preexisting affordances, and constitutive norms that engender and create the affordances themselves, which guide and determine the acquisition and cultivation of abilities, without which the respective affordances would not exist. Yet these constraints feed into one another, to the point, perhaps, where the distinction itself becomes one not of kind but of degree. Given an established set of affordances, constituted in virtue of abilities cultivated in a particular community, regulative norms differentially emphasize certain affordances, certain potentialities for action, over others. Take the example of utensils. We become better able to hold and use utensils in specific ways, due to our being brought up and taught to use them in those ways. (p. 251)

Elias' account is in line with Wittgenstein's conception of normativity in that what is deemed well-mannered and appropriate is determined by how our experience and behavior flow with the world and with others. We perceive the right affordances and engage appropriately with them when our doing so does not clash with the material conditions and possibilities imposed by the environment, and crucially when it does not clash with others' ability to recognize what we are doing and to respond to it. According to Schatzki (1996), sociocultural practices are constituted precisely by these shared skills of a community: to behave in a particular way, and to recognize and respond when others do so. Our earlier provided definition of human skilled performance can now be improved: It is the enactment of a network of sensorimotor schemes whose normativity is determined by the sociocultural practices to which the agent belongs. Belonging to these practices requires a complex and long training period that, when successful, leads the agent to engage with the relevant affordances in a fluid, correct, and embodied manner and changes its body repertoire so that it "feels at home" in the activity. Consider, for example, how the highly skilled performances of Formula 1 professional drivers are normatively constrained not only by the material possibilities of the road, the car, other cars, and the weather, e.g., grooved tires allow better grip in rainy condition than slick tires, but more crucially by the sociocultural practice in which Formula 1 racing is constituted. The whole point of being the fastest systematically in the F1 circuits structures the collective and individual activities of those involved. Because of this socioculturally constituted goal, it becomes relevant for drivers and teams to choose tires that allow them to go a few milliseconds faster, to build together highly expensive and extremely fast cars for the particular conditions of F1 races; it leads drivers to coordinate with their teams and crucially to coordinate with their respective cars on the road, etc.

Acquiring and maintaining skills constituted in sociocultural practices in general implies that agents' affective orientation towards the world is shaped and normativized by the shared practice itself. Consider again that for expert F1 drivers, a crucial part of their expertise is in caring about how to interact with the environment in degrees that would be practically unnoticeable to others, e.g., subtle differences on the wetness or dryness of a road, subtle differences in the car suspension, and, crucially, subtle differences between a lethal maneuver and a risky but admirable one. There is a normative component in these forms of caring: agents can be wrong in caring about things that are not relevant for the ongoing skilled performance, e.g., caring about the level of oil when the car has just lost a tire and is out of control, and they can be wrong in the form in which they care, that is, in the way in which they engage with the aspect of the environment towards which they are oriented, for example, going for a change of tires because of a short drizzle. Notice that what matters and how it matters to a skilled individual not only can be right or wrong according to the established practice, but it also leaves room for innovation of the practice itself. For example, how a driver responds to slippery roads on rainy days can either be good because it follows the pattern of the activity or it could be groundbreaking when it results in faster laps (and living drivers). In short, the conative aspect intrinsic of being a cognitive agent is normatively transformed and maintained in skilled performances.

The particular instances of the drivers' skillful performances are not random and unarticulated occurrences; rather, they are tied together by the fundamental concern of the agents' with maintaining their identity as professional F1 drivers. Moreover, we believe that the sociocultural shaping of affectivity in skilled performances is not limited to the sociocultural identity of the agent but, to some extent, may reach the basic feeling of self-affection and its sensorimotor identity too. When skills involve using tools, as in the case of F1 drivers with their cars, the tools become part of the felt body of the agent in that they feel right without being objects of attention; when skills do not involve using tools, as in the case of dancing, agents become sensitive to subtleties in their moving body that would be otherwise unnoticed.

This conception of sociocultural skill as inherently affective has a further implication with which we would like to conclude this section. First, skilled agents are necessarily affective agents. It can be meaningfully said only of systems capable of being affectively moved that they care or fail to care about the right aspects of the environment. Moreover, caring also moves the agent to continue the interaction and find solutions to obstacles. This implies that artificially implementing skilled intentionality will require agents to affectively move and orient themselves flexibly towards the right aspects in the world.

5 Conclusions

We defended a conception of skilled intentionality as a felt orientation towards environmental aspects that matter both affectively and normatively to the agent for self-preservation. Preserving their own form of life is an intrinsic purpose of all cognitive agents and allows them to establish an intentional orientation towards the

affordances in their environment. Preserving one's form of life is to preserve one's identity which has at least three dimensions: a biological metabolic dimension in which the agent is concerned with maintaining itself alive, a sensorimotor dimension in which the agent has patterns of interaction with the environment that allow it to smoothly and routinely go about the world, and a sociocultural dimension which comprises the patterns of interaction with others and with socioculturally crafted environments that constitute the identity of the agent in society. This means, on one hand, that affordances towards which agents can affectively orient themselves are precisely the aspects of the environment that are or can be relevant for maintaining their socioculturally constituted and organismic form of life. Such affordances constitute the world of significance of the agent, i.e., its *umwelt*. On the other hand, this implies that the normativity by which agents' interactions are evaluated is their form of life, so following this normativity is intrinsically valuable for cognitive agents. As human forms of life and their respective identities are constituted in shared sociocultural practices, what counts as a right, successful, accurate, etc., activity for maintaining a form of life depends on the community and the material environment rather than the perception of the agent.

Acknowledging the affective dimension of intentionality opens up further questions; for example, if we accept that affectivity permeates every engagement with our environment, then every decision is influenced by it, but how much and to what extent is this influence remains an open question. Moreover, if normativity is ultimately founded in the agents' intrinsic purpose of maintaining their own form of life, and this form of life is socioculturally shaped for humans, then preserving one's form of life implies preserving one's community. These two questions are particularly important for ethical considerations, as it would compel us to adopt an embodied ethics of care in which the collective life of oneself and others is central in a new framework by which to study moral cognition rather than traditional representational reason-based approaches.

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References

- Baggs, E., & Chemero, A. (2018). Radical embodiment in two directions. *Synthese*. <https://doi.org/10.1007/s11229-018-02020-9>
- Baggs, E., Raja, V., & Anderson, M. L. (2020). Extended skill learning. *Frontiers in Psychology*. <https://doi.org/10.3389/fpsyg.2020.01956>
- Bruineberg, J., Chemero, A., & Rietveld, E. (2019). General ecological information supports engagement with affordances for 'higher' cognition. *Synthese*, 196(12), 5231–5251. <https://doi.org/10.1007/s11229-018-1716-9>
- Chemero, A. (2009). *Radical embodied cognitive science*. MIT Press.
- Colombetti, G. (2013). *The feeling body: Affective science meets the enactive mind*. MIT Press.

- Di Paolo, E. (2005). Autopoiesis, adaptivity, teleology, agency. *Phenomenology and the Cognitive Sciences*, 4(4), 429–452
- Di Paolo, E., Buhrmann, T., & Barandiaran, X. E. (2017). *Sensorimotor life: An enactive proposal*. Oxford University Press.
- Di Paolo, E., Cuffari, E. C., & De Jaegher, H. (2018). *Linguistic bodies: The continuity between life and language*. MIT Press.
- Dotov, D., Nie, L., Wojcik, K., Jinks, A., Yu, X., & Chemero, A. (2017). Cognitive and movement measures reflect the transition to presence-at-hand. *New Ideas in Psychology*, 45, 1–10
- Dreyfus, H. L. (2002). Intelligence without representation—Merleau-Ponty's critique of mental representation The relevance of phenomenology to scientific explanation. *Phenomenology and the Cognitive Sciences*, 1(4), 367–383
- Elias, J. Z. (2017). 13 the extent of our abilities: The presence, salience, and sociality of affordances. *Embodiment, Enaction, and Culture: Investigating the Constitution of the Shared World*, 245.
- Feiten, T. E. (2020). Mind after Uexküll: A foray into the worlds of ecological psychologists and enactivists. *Frontiers in Psychology*. <https://doi.org/10.3389/fpsyg.2020.00480>
- Fuchs, T. (2018). *Ecology of the brain: The phenomenology and biology of the embodied mind*. Oxford University Press.
- Gallagher, S., Hutto, D., Ilundain-Agurruza, J., Kirchhoff, M., Miyahara, K., & Robertson, I. (2019). Minds in skilled performance: From phenomenology to cognitive explanations. *Annual Review of the Phenomenological Association of Japan*, 35, 1–20
- Gastelum, M. (2020). Scale matters: Temporality in the perception of affordances. *Frontiers in Psychology*, 11, 1188
- Helm, B. W. (2009). Emotions as evaluative feelings. *Emotion Review*, 1(3), 248–255
- Heras-Escribano, M. (2019). *The philosophy of affordances*. Palgrave Macmillan.
- Hodges, B. H. (2007). Values define fields: The intentional dynamics of driving, carrying, leading, negotiating, and conversing. *Ecological Psychology*, 19(2), 153–178
- Ingold, T. (2011). *Being alive: Essays on movement, knowledge and description*. Taylor & Francis.
- Merleau-Ponty, M. (2012 [1962]). *Phenomenology of perception* (D. Landes, Trans.). Routledge.
- Michaels, C. F., & Carello, C. (1981). *Direct perception*. Prentice-Hall.
- Millikan, R. G. (1995). Pushmi-pullyu representations. *Philosophical Perspectives*, 9, 185–200
- Mojica, L. (2020). Reclaiming meaning, reclaiming normativity. *Constructivist, Foundations*, 15(3), 216–218
- Mojica, L., & Froese, T. (2019). On the spatiotemporal extensiveness of sense-making: ultrafast cognition and the historicity of normativity. *Synthese*, 1–14.
- Moreno, A., & Mossio, M. (2015). *Biological autonomy: A philosophical and theoretical enquiry*. (Vol. 12) Springer.
- Pacherie, E., & Mylopoulos, M. (2020). Beyond automaticity: The psychological complexity of skill. *Topoi*, 1–14.
- Pellegrini, A. D., Dupuis, D., & Smith, P. K. (2007). Play in evolution and development. *Developmental Review*, 27(2), 261–276
- Port, R. F., & Van Gelder, T. (1995). *Mind as motion: Explorations in the dynamics of cognition*. MIT Press.
- Rietveld, E., & Kiverstein, J. (2014). A rich landscape of affordances. *Ecological Psychology*, 26(4), 325–352. <https://doi.org/10.1080/10407413.2014.958035>
- Schatzki, T. (1996). *Social practices: A Wittgensteinian approach to human activity and the social*. Cambridge University Press.
- Sheets-Johnstone, M. (1999). Phenomenology and agency: Methodological and theoretical issues in Strawson's 'The Self.' *Journal of Consciousness Studies*, 6(4), 48–69
- Slaby, J. (2008). Affective intentionality and the feeling body. *Phenomenology and the Cognitive Sciences*, 7(4), 429–444
- Slaby, J. (2012). Emotional rationality and feelings of being. *Feelings of being alive*, 8, 55
- Slaby, J., & Wüschner, P. (2014). Emotion and agency. *Emotion and Value*, 212–228.
- Stanley, J., & Williamson, T. (2017). Skill. *Noûs*, 51(4), 713–726. <https://doi.org/10.1111/nous.12144>
- Szokolszky, A., Read, C., Palatinus, Z., & Palatinus, K. (2019). Ecological approaches to perceptual learning: Learning to perceive and perceiving as learning. *Adaptive Behavior*, 27(6), 363–388
- Thompson, E. (2007). *Mind in life: Biology, phenomenology, and the sciences of mind*. Belknap Press of Harvard University Press.

- 1095 Turvey, M. T., Shaw, R. E., Reed, E. S., & Mace, W. M. (1981). Ecological laws of perceiving and acting:
1096 In reply to Fodor and Pylyshyn (1981). *Cognition*, 9(3), 237–304
1097 Varela, F. (1991). Organism: A meshwork of selfless selves. In *Organism and the origins of self* (pp.
1098 79–107): Springer.
1099 von Uexküll, J. (1926). Theoretical biology.
1100 von Uexküll, J. (1957). *A stroll through the worlds of animals and men, instinctive behavior*. (pp. 5–80).
1101 Int. Univ. Press.
1102 Weber, A., & Varela, F. (2002). Life after Kant: Natural purposes and the autopoietic foundations of bio-
1103 logical individuality. *Phenomenology and the Cognitive Sciences*, 1(2), 97–125. [https://doi.org/10.](https://doi.org/10.1023/A:1020368120174)
1104 [1023/A:1020368120174](https://doi.org/10.1023/A:1020368120174)
1105 Wheeler, M. (2005). *Reconstructing the cognitive world: The next step*. MIT Press.

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