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Unpacking an affordance-based model of chronic pain: a video game analogy

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Abstract
Chronic pain is one of the most disabling medical conditions globally, yet, to date, we lack a satisfying theoretical framework for research and clinical practice. Over the prior decades, several frameworks have been presented with biopsychosocial models as the most promising. However, in translation to clinical practice, these models are often applied in an overly reductionist manner, leaving much to be desired. In particular, they often fail to characterize the complexities and dynamics of the lived experience of chronic pain. Recently, an enactive, affordance-based approach has been proposed, opening up new ways to view chronic pain. This model characterizes how the persistence of pain alters a person's field of affordances: the unfolding set of action possibilities that a person perceives as available to them. The affordance-based model provides a promising perspective on chronic pain as it allows for a systematic investigation of the interactive relation between patients and their environment, including characteristic alterations in the experience of their bodies and the space they inhabit. To help bridge the gap from philosophy to clinical practice, we unpack in this paper the core concepts of an affordance-based approach to chronic pain and their clinical implications, highlighting aspects that have so far received insufficient attention. We do so with an analogy to playing video games, as we consider such comparative illustration a useful tool to convey the complex concepts in an affordance-based model and further explore central aspects of the lived experience of chronic pain.

Keywords Enactivism · Landscape of affordances · Field of affordances · Lived body · Lived experience · Clinical practice

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1 Introduction

We undergo various experiences that we regard and report as pains throughout life. The central characteristic of pains is that they are identified through the first-person perspective (Raja et al., 2020). Pains are typically defined as a particular group of experiences that feel the same or at least similar enough (Aydede, 2017). This group of experiences is malleable based on a multiplicity of interrelated factors: biological (e.g. genetic, neural, immune-endocrinal), psychological (e.g. beliefs, expectations, emotions), and social (e.g. stigmatization, familial support, messages conveyed in health care) (Cormack et al., 2022). Pains typically fulfill an adaptive function in the protection of an organism's integrity; however, pains can also impose adverse effects when recurrent or persistent. If pain remains for longer than about three months, it is commonly referred to as *chronic* and constitutes one of the most widespread and disabling medical conditions globally (Dahlhamer et al., 2018; Hay et al., 2017). Yet, we are still faced with not having a satisfying theoretical framework of chronic pain for research and clinical practice.

In the '70s, George Engel (1977) presented the *Bio-Psycho-Social* (BPS) model which was intended to expand beyond the confines of biomedicine that focused on biological anomalies while ignoring or downplaying psycho-social aspects. In contrast, the BPS model looked to reframe the focus on human experience, taking a more inclusive approach to healthcare. This model was not developed for (chronic) pain by design, yet many later applied it in this context (Cohen et al., 2021). Although Engel's model was groundbreaking at the time, it reveals several shortcomings, related to its insufficient theoretical foundation, which facilitates misinterpretations and misapplications (Cormack et al., 2022). Applications of the BPS model to pain inadequately characterize the lived experience of patients as the complexity and depth of how chronic pains can affect a person's perception of themselves and their environment remains largely unexplored. Further, clinical applications leave much to be desired, as they commonly dissect the patient into a trichotomy of isolated biological, psychological, and sociological silos interacting in linear ways (Mescouto et al., 2020; Stilwell & Harman, 2019).

Enactivist approaches to pain offer a useful heuristic for research and the treatment of individuals experiencing chronic pain as it brings together insights from different traditions and aims to overcome the shortcomings of the BPS model (Cormack et al., 2022; Stilwell & Harman, 2019). In general, enactivism takes into account the entire person, including the brain and body, in interaction with their environment. From an enactive perspective, pain is (i) constrained by the dynamic coupling of the neural and non-neural body (*embodiment*), (ii) dependent on the bi-directional relation between person and environment (*embeddedness*), and (iii) brought forward by a person's interactions with the environment (*enactment*) (Coninx & Stilwell, 2021; Miyahara, 2019; Stilwell & Harman, 2019). Addressing chronic pain should involve more than just looking for and treating a 'root cause'; instead, the transition to chronicity is to be understood as an idiosyncratic process with a multiplicity of biological, psychological, and socio-cultural factors interacting in non-linear ways. Therefore, we need to address concerned patients as a whole, including their lived experiences.

Such an approach also needs to address the action-orientated character of pains and their potential to be transformed by changing contexts and important life events.

Coninx and Stilwell (2021) outlined an enactive approach to pain that detailed how living with chronic pain can shape and bias an individual's experience of their possibilities to engage with their environment. Their paper provides a new way to think about pain based on *affordances*, that is, the action opportunities that the environment offers organisms that can recognize and respond to them (Gibson, 1979). An enactive approach to affordances puts the focus on the first-person perspective, analyzing how pain can transform the experience of concerned patients. This enables us to better understand chronic pain in terms of alterations in an individual's active embodied engagement with the environment and the perceived possibilities to act that it offers. Thus, an affordance-based approach provides the tools to identify systematic changes in the experiences of patients over time. However, key aspects of the affordance-based model of chronic pain require further clarification.

First, existent affordance-based models of chronic pain focus primarily on the dynamic changes in the experience of the space a person inhabits and the action possibilities that it offers. At the same time, this process corresponds to characteristic changes in the experience of a person's body which need to be taken into account to provide a sufficiently complex picture of the experiental alterations in chronic pain. Although the body always plays a central role in enactive models, the particular relation between the lived and living body has not yet been carefully analyzed in the context of chronic pain. Second, it remains so far unclear whether the indicated transformation in the perception of affordances is unique for pain. What is thus needed is a comparison between the changes in the field of affordances in chronic pain and corresponding alterations in other conditions of chronic illness (e.g. breathlessness) or affective disorder (e.g. depression). Third, the topic of affordances often remains complex and abstract, and therefore direct translations into practice can be difficult to achieve. To date, we lack a compelling illustration to facilitate communication between philosophers, researchers, practitioners, and patients as well as the systematic application of the affordance-based model to clinical practice.

This paper aims to carefully unpack the core concepts of an affordance-based model of chronic pain and illuminate them in an informative manner. In that, we aim to further theoretical debates on different facets of the affordance-based model. At the same time, we discuss the concrete implications of the model for clinical practice and health care, focusing especially on those aspects that have so far received too little attention, such as the different epistemic perspectives relevant to treatment and the clinician's role in the chronification of pain. For these purposes, we use an innovative *analogy* referring to playing video games as an illustration that has proven successful in exchange with philosophers, researchers, clinical practitioners, and patients.

The paper is structured as follows: in § 2, we address the role of analogies in pain research and management and explicate the prospects and limitations of the particular analogy we employ subsequently. In § 3, we unpack the core concepts of affordance-based approaches. We hereby draw on recent debates on affordances (e.g., Dings, 2018, 2020; Rietveld et al., 2019; Rietveld & Kiverstein, 2014; Withagen et al., 2012), particularly in the area of medicine and psychiatry (e.g., Coninx & Stilwell, 2021; de Haan et al., 2013; Gallagher, 2018; Krueger & Colombetti, 2018).

Furthermore, we emphasize the intimate link between changes in affordances experienced as available in the environment and changes in the experience of one's body as the medium of interacting with the environment (e.g., Carel, 2016; de Haan et al., 2013; Ratcliffe, 2008). In § 4, we apply the introduced concepts, addressing systematic alterations in the lived experience of the environment and the body in chronic pain, also in comparison to other kinds of chronic illness and affective disorders (e.g., Carel, 2016; Fabry, 2020; Fuchs, 2005; Svenaeus, 2021). In § 5, we highlight the implications of the affordance-based model for health care practice. We hereby refer to work on how pain affects patients and outline how these insights can be fruitfully incorporated into therapy (e.g., Carel, 2016; Coninx & Stilwell, 2021; Kusch & Ratcliffe, 2018; Stilwell & Harman, 2021; Svenaeus, 2015, 2021). Finally, § 6 summarizes our considerations.

2 Analogies in pain research & management

Before addressing affordance-based approaches, this section provides central remarks about the role of analogies in science and why we consider the systematic development of an analogy in the context of chronic pain as useful. Further, we specify the prospects and limitations of the particular analogy we envisage based on the similarities and dissimilarities between the two domains that we bring together: experiencing chronic pains and playing video games.

In general, analogies can facilitate the understanding and application of scientific models. Analogies can be powerful heuristic tools to convey scientific knowledge in the cascading communication between philosophers, researchers, practitioners, and patients. They can facilitate intellectual access to the central aspects of a model and foster knowledge generation by means of highlighting the similarities between objects, properties, and structures of different conceptual domains while disregarding others (Jones, 2002). Illustrative comparisons, such as analogies and metaphors, thereby fulfill several *epistemic functions*: facilitating understanding in mapping well-understood and less well-understood domains, emphasizing aspects that would otherwise go unnoticed, and opening up new perspectives that might guide further investigation (Kompa, 2022).

In this paper, we use certain resemblances between the factors that are involved in the maintenance and generation of chronic pain and their impact on patients, on the one hand, and the factors involved in certain video games and their impact on players, on the other. Of importance, in using a video game analogy, in no way are we downplaying lived experiences of pain. Rather, we try to make the experiential world of living with pain, and a complex model of such, more accessible by exemplifying something more abstract and unfamiliar (affordance-based model of chronic pain) using something more concrete and already known (playing a video game). In addition to this *explicatory function*, the analogy might also provide *exploratory value* in that it contributes to thinking about underappreciated aspects of the target phenomenon, that is, the lived experience of chronic pain and its action-orientated character.

We believe a central advantage of the video game analogy is providing a coherent illustration for understanding complex aspects of the affordance-based models of

chronic pain and making their relation to each other more accessible to researchers, practitioners, and patients. In particular, game situations are well-suited to illustrate central aspects of the relation between person and environment, as the involved game character and game world are artificially designed and as such can be flexibly adapted to bring about differences in experience of the player and their interaction with the game world. That is, we can easily imagine setting up a complex game design and manipulating central parameters of our game character and correspondingly imagine what it would feel like to engage with the game world. In real life, such global and profound manipulations of the environment or one's abilities to engage with it are not only difficult to implement, but it may also be more difficult to imagine what it would be like. That is, video games provide a technological tool constructed to enable alternative experiences while allowing for the flexible manipulation of various relevant parameters at once. We therefore consider the analogy of playing video games as particularly illustrative in comparison to a collection of rather fragmented real-life examples that are often more constrained or drawn out across time. Furthermore, we think that our analogy therefore also serves especially well an explorative function (see § 5).

Analogies and metaphors are not to be accepted uncritically, as they can in some cases be rather misleading and harmful (Neilson, 2016). For example, illustrations that relate to broken machines have long been commonly applied with serious impacts on pain research and treatment, including the self-understanding of patients and clinical practitioners (Jevne, 2015; Setchell et al., 2017; Stilwell et al., 2021). In contrast, we hope that the analogy developed here can contribute to a more complex, action-oriented, and person-centered understanding of chronic pain. At the same time, we should keep in mind that analogies are not to be taken literally and naturally come with certain limitations. Analogies are based on relevant *similarities* between different conceptual domains, but there always remain *dissimilarities* that need to be made explicit. We should consider analogies only as what they are: useful illustrations. Upfront, two crucial remarks should therefore be made concerning the particular analogy we employ and develop in the subsequent sections.

First, our goal is not to accurately depict actual gameplay mechanics to be found in a single game or game genre; rather, comparisons to video games are used as means of illustration that foster understanding of and further thinking about the affordance-based model of chronic pain. This means that no special knowledge about a particular kind of video game is presupposed, while readers who are well versed in this field may have to abstract from some common practices. The examples we use often refer to mechanisms found in role-playing games, but also some that are typically implemented in game tutorials, click-and-point adventures, or platform-adventures. Further, it is to be noted that especially in the illustration of chronic pain (see § 4), we describe mechanisms that are not necessarily an intentional part of the game design but the result of technical or conceptual mistakes.

Second, we use the video-game analogy to illustrate which aspects can affect the lived experience of people and in which manner different facets of one's lived experience are thereby altered. In our analogy, we need to account for the relationship between the game character and the game world as well as the player interacting with the game world through the game character. This is an important difference to

real-life cases, in which only the agent and their bodies come into focus without a further mediating entity. We will explicitly address this difference in the following, indicating in which sense it is negligible or can partly even be made fruitful for our purposes. In any case, we should keep in mind that references to the experiences or intentions of the game character are not meant literally. At best, they constitute an illustrative personification presupposing a player in the background. It is clearly not the game characters themselves, but the players who co-determine the behavior of the characters and perceive the game world as enabling certain activities. Thus, the analogy presented here always involves a player who engages with the game world through the game character.

3 Core concepts

A central idea of enactivism is that humans meaningfully relate to their environment in rich, bi-directional interactions mediated by the body. In this picture, chronic pains can be understood as fundamentally changing how a person dynamically attunes and relates to their environment, affecting how they experience themselves, the environment, and their body. One way to conceptualize such alterations in the process of chronification is in terms of affordances, drawing from the enactive tradition and ecological psychology (Coninx & Stilwell, 2021). Using this general approach, we aim to structure the complexity of lived experiences and their possible transformation along central aspects that should do justice to the uniqueness of the lived experiences of individuals while at the same time enabling generalizations concerning paradigmatic alterations across these idiosyncratic cases (Carel, 2016). In § 3.1, we introduce some of the most central concepts of affordance-based approaches: landscapes and fields of affordances. In § 3.2, we outline how the field of affordances is determined by different dynamics and dimensions. In § 3.3, we introduce the distinction between the living and lived body, indicating how changes in the field of affordances relate to changes in the experience of one's body. Along these subsections, we develop the indicated analogy to playing video games.

3.1 Landscapes & fields

As a first core concept of affordance-based models, we should address the *landscape of affordances*. The landscape of affordances is the plurality of action opportunities available to the members of a certain species (Bruineberg & Rietveld, 2014; de Haan et al., 2013; Rietveld et al., 2019). Affordances depend on the being's characteristics in relation to the environment's features (Chemero, 2003). In terms of our game analogy, we can think about the landscape of affordances as all the possibilities for interaction that the game world *in principle* offers and that the player can *in principle* become responsive to, given the particular kind of character they play.

The landscape of affordances is determined by the features of the designed game world *and* the abilities of the game characters as the medium of interaction with the game world. That is, the same situation might afford different actions when playing a different character, and different contexts might shape the affordances that the

environment offers while playing the same character. As a simple example, we can think of a path that is blocked by a rock. When playing a tall troll character, this may afford to lift the rock, when playing a strong dwarf character with an ax, this may afford to split the rock, while playing an agile elf character, it may afford to climb over the rock. Different characters have different bodies concerning, for example, size, strength, or agility, which enable different interactions with the world. Just like in reality, we enter the game as (virtually) *embodied* characters allowing for certain interactions while we are *embedded* in a particularly structured environment. The abilities that are traditionally considered relevant to the landscape of affordances are species-specific and in real life determined by evolution: humans are born with certain bodies that enable them to engage with their environment in a manner that differs from those available to members of other species. In our game, such abilities are determined at the beginning by our character selection and creation or respectively by the pre-defined settings of the game and honed by the skillset of the player.[1]

The idea of a *rich* landscape of affordances provides a more nuanced understanding as it is considered to not only afford people to perform simple motoric tasks, such as lifting, splitting, or climbing. Instead, the landscape of affordances is much more complex, involving skills of various sorts (de Haan et al., 2013; Hufendiek, 2018; Krueger & Colombetti, 2018; Rietveld et al., 2013, 2019; Rietveld & Kiverstein, 2014; Withagen, 2018). In our game, imagine that we might find a book in an empty house that affords to be read, come into a situation that affords to feel offended, or meet a stranger that affords information exchange. These actions are only open to players with characters that possess certain cognitive, emotional, and/or social abilities allowing these players to interact with the game world through their characters in the respective manner.

The relevant skills that enable someone to respond to a rich landscape of affordances are not only considered constrained by biology but also by socio-cultural practices (Rietveld et al., 2013; Withagen et al., 2012). Landscapes of affordances are relative to certain 'forms of life' (e.g. professions, religions, nationalities, and ethnicities) which come with relatively stable and regular patterns of behavior (Rietveld & Kiverstein, 2014). Certain affordances are available only to members of certain communities who are familiar with specific customs, practices, crafts, or arts, and thus possess related skills. Due to this, the landscapes of affordances of humans vary in relation to the socio-cultural groups they are part of throughout life. In our game, how a character enables us to interact with the world is not only based on their species set at the beginning and their particular characteristics (e.g. size, strength, agility) but also on the people they are interacting with (e.g. non-player character or other players) and the communities they become a part of. For example, when our character joins a certain group (e.g. thieves, soldiers, magicians), we learn practices of such community that open up new possibilities for action. Only for a magician, a set of ingredients affords the making of a potion, and only for a thief, another thief may afford to perform a certain greeting sign that open ups new conversation options.

[1] It is to be assumed that the skills of the game character are accessible to the player, given that they themselves possess the right skills to use the game character for interaction with the game world.

As the second core concept, the *field of affordances* entails all those action possibilities that a particular person perceives as available in a certain situation (Bruineberg & Rietveld, 2014; de Haan et al., 2013; Rietveld et al., 2019). The field of affordances includes those action possibilities that stand out as relevant and that a person is selectively responsive to in a certain moment. The field of affordances is not merely restricted by species or culture-specific aspects but by the idiosyncratic characteristics of the individual, including their personal history, long-term goals, as well as current preferences, needs, and desires (Dings, 2018, 2020). The field of affordances characterizes the relation between a particularly structured physical and social environment and a particularly situated, skilled, and concerned person. That is, we do not perceive the world from a detached and neutral standpoint, but we are related and attuned to the world from an affected point of view. The field of affordances characterizes how we experientially inhabit and relate to the world. It is the subjective excerpt of the landscape of affordances and thus enables us to conceptualize *lived experience*.

In our analogy, the landscape of affordances describes the action possibilities that are *in principle* available when playing a character of a certain species (e.g. troll) or group (e.g. thief) that possesses a certain range of motoric, cognitive, and/or sociocultural skills. In contrast, the field of affordances describes the action opportunities that stand out to a *particular* player as relevant in a *particular* game situation given *a particular* game character. That is, the field of affordances characterizes the *actual game experience* of how the player perceives, navigates, and interacts with the game world through their character. This field of affordances is substantially determined by the players goals and interests. For example, it depends on the previous choices they have made, the skills they enable their character to develop, the storylines they select to pursue with them, or the game styles they adopt. Typically, games are designed in such a manner enabling the alignment or co-development of the goals and interests of the player and those of the game character, ranging from the fulfillment of basic desires (e.g. eating) to the pursuit of more complex long-term storylines (e.g. accomplishment of a quest).

For illustration, we might consider game play situations, such as tutorials, in which the field of affordance is actively manipulated in the game design, making certain opportunities for interaction stand out to the player as particularly relevant. This could be implemented by lightening up certain objects in the game world when approaching them or moving over them with the cursor, indicating vital options for interaction. Which action possibilities are correspondingly indicated might depend on the set-up of the game world and the pre-selected and acquired skills of the character as well as the goals and needs of the game character as defined by the game design or selected by the player. Still, not all actions that are so indicated might also be of interest to the player. For example, the game might indicate a certain storyline as relevant for the character (e.g., lightening up relevant objects to engage with) that the player however is not interested to follow. For present purposes, we do not consider this problematic as there are many game situations in which the skills and interests of character and player naturally align and develop synchronically. Furthermore, the described game play situations in which the field of affordances are actively shaped are particularly interesting as they emphasize that the manners in which we ‘design’

the environment can substantially influence our experience of and interaction with it. Thus, they might play a central role in the application of the affordance-based model to clinical contexts (see § 5).

Finally, it should be noted that due to the difference between the landscape and field of affordances, there can be a divergence between what we are 'actually' capable of, given the general constitution of a person and the particular conditions of the environment, and the options for action that we perceive as available to us in a certain situation (Bruineberg & Rietveld, 2014; de Haan et al., 2013). That is, we might be in principle able to do something, while failing to perceive this as an actual possibility for us. For illustration, imagine that we have chosen to follow the storyline of a game character whose main motivation is to avenge the death of their father. This strong intention might constantly bias the player's field of affordances in a particular direction, although the game character and game world as such would allow for various other options. This involves multiple interdependent processes. First, the previous choices of the player might have already restricted the options that are displayed by the game world, say, for conversation with other characters (e.g., games with branching decision-based stories). Second, the player might also be focused on finding opportunities to follow the respective story line in that they fail to see alternatives for interaction that the game world still displays (e.g., in open world games). This then shapes the choices the player makes, in turn shaping their future field of affordances. We will come back to this aspect in in § 4.2 and § 5.

3.2 Dynamics & dimensions

As a first step, it should be noted that the field of affordances is not static: it evolves and changes in the dynamic interaction between person and environment, along an ongoing cycle of attunement, dis-attunement, and re-attunement (Rietveld et al., 2019). Action possibilities do not always show up in the same manner due to changes on the side of the individual, the environment, or their relationship. In our video game analogy, changes in the field of affordances might be caused, for example, by alterations in the properties of the character (e.g., leveling up, learning new skills), the interest of the player (e.g., pursuing a new quest), the re-localization of the character in the game world (e.g., entering a new area of the game world), or changes in the properties of the game environment (e.g., removing an obstacle). It follows that neither in virtual nor in real life is the field of affordances always the same, as it may be subject to more or less profound fluctuations.

Some changes in the field of affordances might be considered '*transformative*', if they lead to a fundamental and persisting change in the relationship between person and environment, for example, due to alterations in the larger structure of a person's interests, concerns, practices, and body, or important life events taking place (Carel & Kidd, 2020). That is, transformation involves not only episodic fluctuations in the perceived action possibilities but a profound reorientation of the person's field of affordances, for good or bad. In our game, we can compare this with an overall change in the gameplay, which does not only lead to individual changes in the available options for action in certain situations but fundamentally changes the way the game world can be experienced and navigated by the player. This can happen

unintentionally, for example, due to bad game design or bugs, but also intentionally to convey a change in the atmosphere of the surroundings or the personality and interests of the character.

In a second step, we need to explore how the experience of action possibilities can potentially differ. In which manner can our lived experience change or be transformed? So far, it may seem that the only difference is that some action possibilities are available, while others are not. However, we should adopt a more nuanced picture to account for the different manners in which the environment might appear as relevant to us. Along these lines, Coninx and Stilwell (2021) have structured the field of affordances using multiple dimensions, of which we present here a simplified version, focusing on the dimensions of salience and mineness.

First, some affordances appear or are experienced as more or less *salient* as they exert a stronger invitation or force to act (Withagen et al., 2012). In our game tutorial, we might imagine that the degree of relevance of an interaction opportunity could be indicated by the stronger glowing of the respective object in the game world when moving over with the cursor; thus, guiding the gameplay and game experience in a more or less strong manner. For example, when the character is running out of energy, objects that afford rest (e.g., sleeping in a bed) might start to glow stronger while other objects that afford physical activity (e.g., climbing a tree) might glow less and less. Assuming that the player's concern is to meet the character's basic needs, the respective highlights correspond to their field of affordances in playing the game. Further, the dimension of salience is to be considered as possessing two extreme points indicating different *valences*, depending on whether a person's concerns are positive or negative. Affordances can appear or be experienced as more or less relevant either because they are attractive or because they indicate actions that are to be avoided. Imagine that in a game not only those interactions are indicated that are attractive for the character (e.g., eating an apple) but also those that are potentially harmful (e.g., falling into a lake with a character that can hardly swim). This contrast might be indicated by either a green or red glow of different intensity, signaling an increasing or decreasing invitation to engage in or avoid interaction with the game world. Objects that do not afford any interaction, as they possess no salience of any kind, might indicate such through the absence of any highlights or transparency.

Second, affordances differ concerning their integration into the general background of one's experiences, thoughts, and intentions, and the degree to which they are experienced as integral parts of who we are (Dings, 2020). This aspect of *mineness* plays a central role to understand in which manner interactions with the environment relate to our self-concept and self-image. In terms of our analogy, think of the character with a revenge storyline that the player chooses to pursue. We can imagine that in this context certain actions are not only relevant but meaningful, as they are directly connected to who the character is supposed to be. These are the kind of actions that do not only allow the player to explore and profit from interactions with the game world, for example, to keep the character alive or level up, but to further their particular storyline and evolve the narrative of the game. For the player, decisive game progress is made by such interactions through which the game world gains depth and significance. Mineness here characterizes the degree to which a player does not only

engage with but cares about and identifies with the game world and the interactions it offers through the game character.

In our view, this framework proves useful, as it provides a new perspective enabling a better understanding of how different conditions can alter an individual's engagement with the environment and the perceived possibilities to act that it offers.[2] This does not imply that the outlined model can exhaustively capture the complexity and depth of our lived experience. In principle, the phenomenological tradition provides us with several concepts regarding the structural features of human existence that may guide our study of how lived experience can be shaped and altered (Køster & Fernandez, 2021) – surely not all of them are adequately represented in the outlined model. This leaves us with two options, at least. Either we are confident that the further exploration of the field of affordances provides additional dimensions needed to do justice to the multifaceted nature of our lived experience (e.g. de Haan, 2013; Dings, 2018, 2020). Or we accept that we ultimately need to go 'beyond affordances', as they constitute a too coarse-grained conceptual tool to adequately capture the nuances of our lived experience (Ratcliffe, 2013; Ratcliffe & Broome, 2022). Most relevant for us, both options rely on the assumption that affordance-based models can provide a helpful first step to understand how we engage with our environment and how possibilities are experienced, overcoming overly simplistic approaches and acknowledging the relevance of lived experience.

3.3 Living & lived body

The body plays a central role in the affordance-based framework as the action-orientated relation between a person and their environment is commonly considered mediated by the responsiveness of the body (Bruineberg & Rietveld, 2014; Rietveld et al., 2019). The body is the general medium for relating to and inhabiting the world: we perceive the world from the perspective of our body and in terms of what the world allows us to do with such body (Svenaeus, 2015). This means that systematic changes in the lived experience of the space we navigate and the action possibilities it offers typically involve systematic changes in the lived experience of our own bodies understood as two sides of the same coin (Carel, 2016; de Haan et al., 2013; Gallagher, 2018; Krueger & Colombetti, 2018; Ratcliffe, 2008).

Most importantly, and so far not systematically explored, the difference between the landscape and field of affordances as previously introduced corresponds to a distinction between the *living body* and *lived body* (Merleau-Ponty, 1962): the living body describes the physical body and its abilities from a third-person perspective while the lived body characterizes how a person experiences their body from a first-person perspective. The subjective experience of one's body is shaped by the physical body and its actual abilities, however, the living and lived body might equally come apart. For example, a person might in principle be able to perform a certain kind of action, given their motoric, cognitive, or socio-cultural skills, while not perceiving themselves as being capable to do so, given how they subjectively experience

[2] For example, it enables us to characterize the different manners in which acute and chronic pain alter the perception of action possibilities (Coninx & Stilwell, 2021).

their body. The other way around, in phantom limb phenomena concerned patients have the lived experience of an arm or leg that is physically absent and, thus, does not allow for certain actions that they perceive as available. Furthermore, the lived body is, for the most part, experientially transparent or absent: a person is directed toward the external world and the body merely structures the experience and interaction with the world in the background without being itself in the focus (Leder, 1990). Under optimal conditions, the living and the lived body, respectively the landscape and the field of affordances are aligned fostering the experience of effortless and efficacious interaction with the environment. That is, a person can perform those actions perceived as salient and meaningful with the body as a reliable and potent medium of interaction, giving rise to feelings of self-efficacy and control.

With respect to the experience of the lived body, our video game analogy can also prove illustrative, especially when taking a closer look at the relationship of the player to the game character, which are under certain conditions described as undivorceable from one another (Ekdahl & Ravn, 2019). In real life cases, the body provides the central point of view on the world and the sole medium that enables us to engage with it. Similarly, the avatar offers a certain perspective on and access to the game world. While the particular visual perspective may vary more strongly (e.g., first person, third person, or over-shoulder perspective), the avatar constitutes the medium which enables interaction with the game world. Most interesting to our purposes, players might experientially incorporate not only their technical equipment (e.g., keyboard, mouse, controller) but also the virtual character, in particular when they are highly skilled (Ekdahl, 2021). This means that, under optimal conditions, the game character becomes transparent and the player might directly perceive those action opportunities in the game that the particular character enables due to their abilities and that stand out as relevant given the particular game design. This does not mean that the virtual bodies and abilities of characters do not influence the game experience, although more implicitly. For example, in some games, the walking speed of a character may be slowed or sprinting prevented when a character is injured or heavily loaded, which impacts the felt game speed and flow of interaction. Furthermore, we assume that especially when the game character enables engaging in salient and meaningful activities, similar to the body, it might be experienced as particular reliable and familiar by the player.

4 An affordance-based approach to chronic pain

Based on the previous introduction to the field of affordances, we will now address the question of how it changes in chronic pain, again, using the analogy of playing video games. Similar to other clinical conditions, living with chronic pain can substantially transform how people perceive their environment and respond to it. In § 4.1, we outline typical alterations in the structure of the experience of chronic pain patients in terms of dynamic alterations in the field of affordances. In § 4.2, we relate these paradigmatic changes in the field of affordances to paradigmatic changes in the lived experience of their body. In § 4.3, a systematic comparison is drawn between the outlined characteristics of chronic pain conditions and other conditions of chronic

illness (e.g. breathlessness) and affective disorder (e.g. depression). This enables us to characterize the similarities and differences between these closely related conditions.

4.1 Chronic pain

In contrast to acute pain, chronic pain profoundly affects the interactive stance of a person toward the world, permeating all aspects of their life. Chronic pain can be thought of as a disruption or breakdown of the person's complete 'being-in-the-world', that is, their sense of inhabiting and navigating the world (Carel, 2016; Svenaeus, 2015). This change might be considered transformative as chronic pains fundamentally change the structure of how a person attunes and relates to their environment, affecting how the world shows up to the person: threatening, alien, meaningless, and immutable.[3] In persistence, pain can become a deep-rooted part of who the person perceives themselves to be, affecting how they experience their body and which future they see for themselves; ultimately altering their sense of self (Smith & Osborn, 2007). These permeating alterations can be (partly) analyzed in terms of paradigmatic changes in the field of affordances and their dimensions (Coninx & Stilwell, 2021).

First, in chronic pain, positively valenced possibilities to act seem to overall lose their *salience* or change their *valence* becoming negative affordances. Fewer and fewer objects display attractive forms of interaction. The world of a person in chronic pain can become less engaging as the pool of positive options for interaction becomes more and more restricted (Breivik et al., 2006). Analogous to our game, we might imagine a game world in which there are only a few objects left that offer player interactions. This could be displayed in that, when we approach or hover over them with the cursor, the glow of objects is in general significantly diminished and eventually vanishes completely. Overall, the game world shrinks in terms of the actions it invites to perform. Furthermore, more and more action possibilities might be associated with increased pain and fear. That is, the world does not only close itself but it appears more and more threatening (Meulders, 2019; Sündermann et al., 2020). In our game world, we have to imagine this in such a way that it no longer dynamically enables altering attractive and aversive action possibilities, but with increasing tendency, actions present themselves overall as less attractive and more aversive to the player. For example, many objects fail to indicate interaction, or they signal danger, e.g., by a red glowing. Correspondingly, we can imagine the growing feeling of being externally controlled by the situation and losing the freedom to act, as the person in pain or the player in the game situation takes a more and more passive role in engaging with a world that is devoid of attractive options for interaction and rich of signals of avoidance. The (game) world is no longer welcoming but feels cold or even hostile.

Second, in chronification, the changes in the field of affordances also changes in terms of *mineness*, concerning those activities that appear most central to affected patients, including the habitual fulfillment of central roles in their lives (Karos et

[3] Chronic pain changes the overall orientation of a person in the world similar to what Matthew Ratcliffe (2008) labels 'existential feelings' or Fredrik Svenaeus (2021) as a person's 'world-destroying power'.

al., 2018). Overall, this leads to a felt loss of opportunities to engage in purposeful activities (Singh et al., 2018): either because some activities are no longer experienced as meaningful, or because meaningful activities are experienced as something to be avoided. The impossibility to engage in personally important life events is often associated with feelings of alienation and isolation, making the world an 'unhome-like' place (Svenaeus, 2011, 2015). This also relates to increasing disengagement in socially relevant activities, feelings of embarrassment, shame, and loss of interpersonal trust (Kusch & Ratcliffe, 2018; Smith & Osborn, 2007; Svenaeus, 2015). In terms of our analogy, those activities that are central to the narrative of the overall game or the particular goal that the player aims to pursue are either not available or come with negative implications for the game experience. This means that the player can't progress and continues to 'lose' or be stuck in a particular scenario. The available actions are experienced as generic or unidimensional (e.g., surviving rather than thriving) and do not add to the depth or familiarity of the game. As such, the gaming world is not perceived as a source of gratification and significance, but of alienation and unease, especially when other players are involved that might become aware of the player's failure to achieve meaningful goals (e.g., in multiplayer settings).

4.2 The 'broken' body

Overall, chronic pain is characterized by an unfolding pattern of losing opportunities to meaningfully engage with the environment. In pain, the body is no longer experientially transparent, rather, it isolates the person from the environment as it becomes the focus of attention. The body is no longer the medium that enables smooth interaction with the environment but the obstacle that resists such interaction (Kusch & Ratcliffe, 2018; Leder, 1990; Svenaeus, 2015). In the process of chronification, interaction with the environment demands more and more effort and planning while the intuitive feelings of certainty and trust concerning the abilities of one's own body are replaced by feelings of 'bodily doubt' disrupting familiar routines and meaningful engagements (Carel, 2016). To put it differently, the body in pain appears like a broken tool that cannot simply be replaced (Svenaeus, 2015). Chronic pain patients often feel trapped in their body which does not seem to work right (Sündermann et al., 2020) while holding negative beliefs about their body considered old, immutably broken, or weak (Singh et al., 2018).

These changes concerning the lived body in chronic pain can be nicely illustrated by the relationship between the player and the game character. As noted earlier, under optimal conditions, the game character is experientially transparent and allows the player to interact directly with the game world without effort or explicit attention. However, this breaks down when character and game world are no longer attuned. If this persists, the character with its virtual body and abilities may increasingly feel useless and even hindering to the player, as it does not allow for crucial interactions with the game world. Unintentionally, this can happen in games when the control is not optimized or when the game design prevents the player from perceiving meaningful action possibilities. At the same time, in some games smooth and habitual interactions might be intentionally interrupted to convey, for example, feelings of

strain, hopelessness, and alienation, which explicitly put the focus on the character and their disabilities.[4]

The aim of using our analogy here is to convey two phenomenal aspects in particular, which may be familiar to many in relation to video games, but foreign to those who do not suffer from chronic pain. First, in the aforementioned game situations, we do not perceive the avatar as a useful mediating entity, but as an obstacle. We no longer trust the character as enabling meaningful interactions and it thus becomes harder and harder to identify with it. Second, as the game character is the only available medium of interacting with the game world, the player becomes isolated and alienated from the environment. If we replace the game character with one's body, we can get a first idea of how the lived experience of the body changes in the chronification of pain. In its persistence the dis-attunement between the pain patient and the environment mediated by the body, respectively between the player and the game world mediated by the character becomes a constitutive and immutable component of the lived (game) experience. Unlike a video game, however, there is no way for those suffering from chronic pain to simply opt-out, reverting to a prior saved point in the game or stopping gameplay.

4.3 Chronic illnesses and affective disorders

Previously, the affordance-based model has been used to outline how chronic pain profoundly changes a person's being-in-the-world, affecting their experience of the environment, themselves, and their body. This is reflected in a systematic restriction of attractive, meaningful action opportunities perceived as available to the person. Interestingly, similar descriptions of changes in lived experience can be found in other forms of chronic illnesses or affective disorders. Therefore, the question arises whether the characterization provided so far is specific to chronic pain or points to a more general phenomenon. For example, many different phenomena may fall under the umbrella of *illness*, characterized by some form of disruption of the attunement between an individual and their environment (de Haan, 2020; Svenaeus, 2000, 2011, 2021). However, there are a few qualities unique to chronic pain to be outlined in the following.

Both chronic pains and other *chronic illnesses* are typically characterized by a felt limitation of positively valued options for action opportunities and a profound alteration of the perception of one's body as an obstacle. This becomes apparent, for example, in comparison of the previous description of chronic pain and the detailed phenomenal analysis of chronic breathlessness in respiratory disease provided by Havi Carel (2016). What might differ in particular instances of chronic pain in comparison to particular instances of other chronic illnesses are the kinds of affordances that are felt as increasingly restricted, while a substantial amount of overlap is still to be expected. For example, sitting might be perceived as increasingly attractive in

[4] Prominently, this mechanism is used in the game 'Gris' (2018). In the first minutes of the gameplay, the character merely walks sluggishly and repeatedly falls to the ground, independent of the player's commands. Together with a barren landscape without possibilities for interaction, monotonous desolate sound design, and minimal color design, the character's grief and hopelessness is to be conveyed in this way.

the case of chronic breathlessness but aversive in the case of chronic lower back pain while both conditions are commonly associated with the experience of physically demanding activities as no longer available (e.g., walking long distance). Still, these differences in the restriction of singular action possibilities alone cannot account for all differences in the complex phenomenology of the considered chronic illnesses. Further work is clearly needed to compare chronic illnesses on the basis of a more nuanced affordance-based model.

As a second class of comparison, we may consider affective disorders, such as depression. Do they lead to the same pattern of changes in the field of affordances as chronic pain and potentially other chronic illnesses? Again, we find some similarities to chronic pain, for example, in feelings of isolation, alienation, and helplessness. However, there appear to be at least two major differences. First, in depression, people tend to live in a grey world with a flattened field of affordances (de Haan et al., 2013; Fabry, 2020; Ratcliffe, 2015): patients overall lose interest in engaging with the environment. In contrast, along the process of pain chronification, the salience of affordances can vary strongly, whereby many activities are very well considered relevant and meaningful. These activities are however no longer perceived as available or even as dangerous to perform. Thus, it is the felt inability to engage in desired and valued activities which may help to distinguish chronic pain from depression which is rather characterized by a loss in interest. Second, in both cases, the body is experienced as an obstacle as it no longer allows for smooth interactions and thus isolates the person from their environment. In the case of depression, this has been described as 'corporealization', as the body is perceived as numb or dead (Fuchs, 2005). In contrast, chronic pain does not necessarily entail such a form of 'disembodiment', but rather of 'hyper-embodiment', as the person often becomes aware of their body and its vulnerability, inability, and limitation. The body in chronic pain is often experienced as broken, weak, or old, but typically as painfully alive rather than resembling a corpse.[5]

In summary, we think that chronic pains reveal an at least paradigmatic pattern of changes in lived experience that can be modeled by an affordance-based approach. This moves chronic pain closer to chronic illnesses, such as breathlessness, than to affective disorders, such as depression. However, it is a promising strand of future research to investigate the exact relationship between these phenomena and their combined effects on the patients' experience. For example, it has been shown that chronic pain and depression can mutually cause and reinforce each other (Ohayon & Schatzberg, 2010). This means that in some cases the profound changes in the field of affordances, which we have characterized as paradigmatic for the respective conditions, might blend and become inseparable from each other.

[5] These characteristic differences do not exclude cases in which chronic pain and depression cause or mutually reinforce each other, so that a strict separation of their influence on a person's experience of themselves, their environment, or their body is no longer possible.

5 Application to clinical practice

In this final section, we make the previously presented insights fruitful for clinical practice. The focus will be on five interrelated topic areas that we consider central, yet often overlooked. The video game analogy fulfills here primarily an explorative function, motivating new ways to think about chronic pain in health care, including the role of clinicians.

'Open up' action possibilities In chronic pain, there is a tendency that attractive action possibilities lose salience and/or become negatively associated. A decisive role in this is often played by overgeneralization of avoidance behavior which may increase negative affect and lead to an excessive restriction of mobility (Vlaeyen & Crombez, 2020). In contrast, clinicians can work to create a context where positively valenced affordances are more salient to the patient and negatively valenced affordances may overall lose their fear and shame afflicted character. That is, *clinicians can help open up the field of possibilities for patients*. For example, they may support patients to avoid excessive rest by explaining that movements may be painful but not damaging and that a graded approach to re-engaging in meaningful activities may help improve function while in pain (Foster et al., 2018; Ray et al., 2022; Smith et al., 2017; Van Dieën et al., 2017). As such, clinicians can support patients to restore a sense of control, familiarity, and meaning, making the environment show up as a more inviting and 'homelike' place for the patient (Svenaeus, 2015). In terms of our game analogy, we may think of the practitioner as creating a game world where those attractive action possibilities still available are better signed or marking some of the aversive ones as still worth taking. With this approach in mind, the clinician becomes the guide or consultant in the game - facilitating a certain path in interaction with the environment by highlighting action possibilities as attractive and instructing the person in learning to overcome aversion to others. As such, the player is supported to become more flexible in the interaction with the environment, perceive a broader range of options, and use cues that make room for change to overcome stuck patterns of behavior. Further, the guide might prioritize instilling new skills for the character, such as tutorials with tips to use in the future; just as clinicians might support patients to develop strategies for self-management (Kongsted et al., 2021).

Search for the 'Holy Grail' In chronic pain, those activities that are considered unattainable may become experienced as increasingly relevant and meaningful. Patients often search for a medical diagnosis as a 'holy grail' which allows them to determine the cause of their pain, leads to a specific treatment, and also protects against social stigmatization as it proves that the pain is valid and not 'all in their head' (Toye et al., 2021). Unfortunately, in many cases of chronic pain, identifying clear pathological causes are simply not possible. At the same time, giving up the search for a 'holy grail' might at first leave patients even more vulnerable. In our game, we may imagine that a character's preferred journey has become diverted down an alternative path. When meaning is overly ascribed to a certain item that apparently allows returning to the original path, failure with regard to the prioritized solution may increase negative emotions while available (and ultimately helpful) solutions are overlooked as alternative (and ultimately unhelpful) paths are pur-

sued. The player is stuck in a certain style of engaging with the world and in the search for a solution, a journey often promoted by clinical approaches to pain management. The search for the 'holy grail' or 'magic bullet' in the context of pain is not only common to patients but also to clinical practitioners which leads to a narrow focus in the investigation and treatment of pain.

> For decades we have scanned, screened and tested. We have rubbed muscles and cracked joints. Spines have been cut, carved and fixated. However, on our seemingly never-ending quest to find the pathoanatomical 'Holy Grail' of pain, we seem to be forgetting something: Our patients are not cars. And we are not mechanics. (Jevne, 2015, p. 198)

Instead of contributing to the search for the 'holy grail', practitioners could function as guides indicating that some quests are better abandoned while there remains a multiplicity of other ways to further one's storyline. That is, professionals can guide patients to set new personal goals which are both meaningful and achievable and to overcome beliefs about the immutability of their current situation (Buchbinder et al., 2018).

Re-experiencing the body In chronic pain, the experience of the interactive space a person inhabits and navigates changes just as the experience of their own body as the medium of interaction. Consequently, a central element of treatment is to guide patients in re-experiencing their body less as an obstacle and more as a useful instrument. One way to achieve this is to direct the attention of patients to their environment so that their body becomes more 'transparent' and moves into the attentional background as something that enables interaction instead of standing in the way of it. Rehab professionals can explore a variety of movement experiments to help patients to move with greater ease and confidence and to promote resiliency and strength over perceived fragility (Caneiro et al., 2021). In terms of our analogy, the clinician again acts like a guide that helps the player use the character's full abilities, optimize the controls, and focus attention on the gameplay itself. Furthermore, the player might learn to adapt to differences in the control, such as a delayed reaction. Instead of resisting the changed situation, players might acquire new skills allowing them to incorporate these aspects and to still achieve goals that are perceived as relevant for the overall game play. This might foster re-experiencing feelings of familiarity and enable the phenomenal incorporation of the character in the increasingly smooth and habitual interaction with the game world.

Perspectives in clinical practice It is once more important to emphasize there is a difference between action possibilities that are in principle available and those that we subjectively perceive as available (Stilwell & Harman, 2021). Independent of whether there is a certain pathological impairment present or not, a person in chronic pain might no longer experience certain action possibilities as available to them and thus be unable to act accordingly. The lived experience of chronic pain is not identical to bodily dysfunction, and it is the lived experience that ultimately determines what action possibilities a person is responsive to. Similarly, the gaming experience and behavior are defined by the options for interactions that the player perceives

as available through the game character, independent of whether there are further opportunities implemented in the game or not that they systematically miss. In clinical contexts, the *living body* is often observed as the primary 'object' of interest to find and target abnormalities to affect the *lived body*: chronic pain is problematically viewed as a symptom of a problem or pathology necessitating a specific physical intervention. Such a model positions the clinician as the knowledgeable and authoritative observer. We can think of this model as implying the misleading analogy 'body as machine' and the clinician as the 'mechanic' (Jevne, 2015; Setchell et al., 2017). In contrast, an affordance-based approach suggests that we cannot 'see' another person's pain or their unique field of affordances, which motivates that we should listen to and validate a person's experiences as real regardless of objective observations from a third-person or outsider perspective (Stilwell & Harman, 2019). This simple change may improve the therapeutic alliance, building trust and mitigating stigmatization (Collier, 2018; Martin et al., 2000). Furthermore, by explicitly addressing differences in the perspectives on the living and lived body in health care, we may reduce potential sources of miscommunication between practitioners and patients (Carel, 2016).

Adapting the clinical environment The experience of disability is about the perceived 'fit' of one's body and the environment (Carel, 2016; Toro et al., 2020). Thus, the reduction of stigmatization, social barriers, and harmful messages may significantly contribute to reducing experiences of bodily limitation, shame, and fear. First, the landscape and field of affordances can be systematically restricted by social-cultural structures and practices, especially with regard to marginalized groups (Maiese, 2022). This restriction in the action possibilities can play a central role in understanding and treating chronic pain. For example, some social groups (e.g. people living in poverty, refugees, members of LGBTQ+communities, indigenous people) are more likely to be at risk of developing chronic pain, face barriers in their access to health care, and are more often neglected in research (Craig et al., 2020; Karran et al., 2020). Structural changes that focus on the more general living conditions of these groups can thus substantially improve their prospects of treatment. Second, an important aspect of the clinical environment is to overcome misguided beliefs about the body which are partly fostered by health care professionals themselves, how they communicate with patients, and the diagnostic labels they provide (Bonfim et al., 2021; Ray et al., 2022; Setchell et al., 2017; Stilwell & Harman, 2017). Analogously, the player is not the only possible target for intervention to overcome frustration. We need to equally consider the game world as it provides the context in which the character is located and partly determines whether action possibilities are 'locked' or 'unlocked'. This game world includes the guide or consultant and the way they address and interact with the player.

Taken together, with an affordance-based approach to chronic pain, treatment is framed as helping the patient to increasingly notice personally meaningful options for action and to view themselves as capable of taking action again. Clinicians can help people with chronic pain to re-attune to their environment; a core aim of therapy is to help people to become 'unstuck'. We can think of clinicians as guides, opening

up possibilities for action, through physical and psychological interventions or the changing of social and institutional contexts. In terms of our analogy, the character seeks aid in their journey from a guide, who has a particular subset of knowledge to impart upon the individual to aid understanding about their experiences and world engagement (O'Keeffe et al., 2019). As a guide, clinicians can aid with pain understanding and sense-making, highlighting specific action options and sign them as worth taking. They can open new storylines and share with the character, implicitly or explicitly, certain strategies that allow them to level up the character's skillset. This general idea of the role of clinical practitioners aligns well with a person-centered approach to healthcare, shifting the view of a person seeking care from a *passive patient* to an *active agent* (Hutting et al., 2021; Walach & Loughlin, 2018).

6 Conclusion

In this paper, we unpacked the core ideas of an enactive, affordance-based model of chronic pain illustrating its complex and abstract concepts by means of a video game analogy. We aimed to carefully analyze changes in perceived action possibilities that paradigmatically characterize chronic pain and foster greater understanding and validation of the complex, dynamic, and, at times, seemingly contradictory experiences and behaviors of people living with pain. In addition, we indicated a shift in conceptualizing the role of clinical practitioners. Instead of viewing them as mechanics who 'fix' patients, they should rather act as guides helping patients to open up or reconstruct affordances so that they can (re)engage in meaningful activities and move towards self-identified goals.

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