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To cite this article: Peter Westmoreland (2017) A philosophical approach to the concept of handedness: The phenomenology of lived experience in left- and right-handers, *Laterality: Asymmetries of Body, Brain and Cognition*, 22:2, 233-255, DOI: [10.1080/1357650X.2016.1164181](https://doi.org/10.1080/1357650X.2016.1164181)

To link to this article: <http://dx.doi.org/10.1080/1357650X.2016.1164181>



Published online: 30 Mar 2016.



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A philosophical approach to the concept of handedness: The phenomenology of lived experience in left- and right-handers

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ABSTRACT


This paper provides a philosophical evaluation of the concept of handedness prevalent but largely unspoken in the scientific literature. This literature defines handedness as the preference or ability to use one hand rather than the other across a range of common activities. Using the philosophical discipline of phenomenology, I articulate and critique this conceptualization of handedness. Phenomenology shows defining a concept of handedness by focusing on hand use leads to a right hand biased concept. I argue further that a phenomenological model based in spatial orientation rather than hand use provides a more inclusive concept of handedness.

ARTICLE HISTORY Received 11 September 2015; Accepted 4 March 2016

KEYWORDS Handedness; laterality; phenomenology; grasping; right hand bias

Introduction

I use the term “handedness” in this paper solely to refer to the handedness of the hands of human beings. Handedness is usually discussed via terms like left-handed, right-handed, ambidextrous, mixed, consistently, or inconsistently handed. These are examples of types of handedness: I seek a general concept of handedness, if such a concept is possible. This article lays a groundwork for seeking that concept. I begin by articulating and evaluating the conceptual model, mostly latent in the literature, guiding scientific work on handedness. This model (among other things) identifies handedness via hand use: especially, by the preference to use and/ or skill in using one hand rather than the other across a range of common activities. Thus, I call it the “hand use model” or “HUM.” As I discuss in detail below, this model provides the basic theoretical framework for scientific approaches to studying handedness, the categories of handedness (left, right, consistent, inconsistent, etc.), and the kinds of questions researchers ask. Moreover, the model is

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significant in experimental design, as the assessment of handedness generally focuses on skill and/ or preference: thus, the practical methods of handedness research indicate a deep commitment to HUM.

Because HUM is implicit or only briefly signalled in laterality research, it would be premature at this point to present it in further detail. This paper's first goal is to articulate and develop HUM, so its structure and implications are clear. I then critically evaluate HUM with the philosophical discipline of phenomenology, which attends to the lived experience of persons in the first person perspective in order to disclose the structures of experience. A phenomenological approach may avoid HUM's weaknesses while offering new insights, especially into the relevance of right hand bias to theorizing and experimental design in scientific research. I next discuss possible objections to my findings. I conclude with a preliminary exploration into further contributions phenomenology can offer laterality studies.

By applying approaches from philosophy, I provide some new concepts and shed new light on old ones. How I reframe the importance of right hand bias in theorizing and experimental design may be of particular interest to researchers, as I argue that such bias is fundamental to HUM and, moreover, underlies the concept of handedness current in handedness research.

HUM

We can posit a general thesis about how researchers understand handedness, given two widespread features of their work. First, we find brief definitions of handedness as the asymmetric lateralization of skills and/ or preferences in hand usage over a broad range of common activities (e.g., Annett, 2002; Papadatou-Pastou, Martin, & Munafò, 2013; Prichard, Propper, & Christman, 2013; Scharoun & Bryden, 2014). Second, it is plain across the literature that, even in the absence of a definition, thinking along these lines informs practices for identifying handedness. In particular, it supplies background for widely used questionnaires that assess hand use according to preference and/ or skill, such as the Edinburgh Handedness Inventory (EHI) (Oldfield, 1971). (I shall use the phrase "EHI and the like" to refer to questionnaires that assess handedness in terms of skill and/ or preference.) (Hardie and Wright (2014), Kelley (2012), and Papadatou-Pastou et al. (2013), especially, consider various questionnaires and inconsistencies between their results. Dragovic (2004) and Annett (2002), among others, offer valuable criticism of EHI. Willems, der Haegen, Fisher, and Francks (2014) provide conceptual discussion of skill and preference. McManus (2002) asks if skill or preference is the origin of handedness. Annett (2002) carefully distinguishes skill and preference in order to develop a graded typology of handedness. Peters (1998) asks if skill or preference is a better determinant of handedness.) It is widely accepted that EHI and the like are the most common tools for handedness

assessment. I surveyed the 2012 year of *Laterality*. That year included 14 articles devoted especially to handedness (Chu, Abeare, & Bondy, 2012; Denny, 2012; Dirnberger, 2012; Dollfus et al., 2012; Fazio, Coenen, & Denney, 2012; Frayer et al., 2012; Kelley, 2012; Ogah, Stewart, Treleaven, & Wassersug, 2012; Preti et al., 2012; Sontam & Christman, 2002; Stein, 2012; Stöckel & Weigelt, 2012; Tonetti, Adan, Caci, Fabbri, & Natale, 2012; Wright & Hardie, 2012). Ten articles utilized EHI and the like. The other four articles discussed handedness in terms of skill and/ or preference. Only two articles gave something approximating a definition or concept of handedness: in both cases, very briefly, language about asymmetry of preference to use one hand rather than the other (Ogah et al., 2012; Preti et al., 2012).

Therefore, although there is scant conceptual-level discussion over the “essence” of handedness, we are safe in considering the definition of handedness as the asymmetric lateralization of skills and/ or preferences in hand usage across a broad range of common activities quite accurate to how thinkers in laterality studies conceptualize handedness, and thus to merit analysis. It is definitive of HUM.

Looking closely at this way of defining HUM, it clearly establishes a snug fit between how to identify handedness and how to conceptualize it. To be handed *just is* to use the hands asymmetrically in an identifiable way. When one has identified a person’s asymmetrical hand use, a type of handedness (left-handed, consistently handed, etc.) is identifiable as well. Categorization by type runs according to the degree to which one matches an ideal: the consistently left-handed or right-handed. These two types form poles with a spectrum in between. Responses to questionnaires about hand usage place the subject on the spectrum. A subject who answers 9 of 10 questions with right-handed responses, for example, comes close to the “right” pole and consistent right-handedness, while the subject who answers 6 of 10 with left-handed responses is inconsistently handed and lies somewhere in between left and right (depending on how the researcher weights the responses, pace Hardie & Wright, 2014). Researchers pose their hypotheses, conform experimental design, and interpret data in light of these procedures. Put simply, HUM informs the basic methodology of the vast majority of handedness research.¹

¹The spectrum idea needs more treatment than I can supply here, but it should be noted that models utilizing a spectrum between two opposed poles are known to encounter serious difficulties in other discussions of bodily difference. See Alcoff (2006) on the black–white binary and accompanying spectrum model of race in the US, for example. Some current research focuses on consistent and inconsistent handedness rather than left- and right-handedness, and organizes handedness in terms of degree of consistency. See Prichard et al. (2013). For this paper, it is worth noting that consistent–inconsistent is still a binary characterization of handedness, and that it tracks degrees between left–right binary poles. Also, consistent–inconsistent still makes its assessments with EHI and the like, which uses left–right binary poles. While still using left–right poles, Annett (2002) provides a more complex, and quite valuable, approach to the left–right binary. Annett strongly rejects the either/or version of the left–right binary and insists that handedness is not a “type,” but a characteristic that “varies continuously

Next, it is illuminating to clarify what “hand use” amounts to on HUM, starting with the activities EHI and the like take to be exemplary for identifying hand use. They are common, everyday activities like sweeping, writing, and throwing: assessment privileges the quotidian, not the unusual. Going further, these activities are, in general, teleological or ends-governed. One could sweep for fun, for example, but usually one sweeps to accomplish the end or goal of cleaning the floor. Thus, ends-directed activities are taken to indicate handedness best. Now, quotidian ends could be met variously, but we usually think there is a “right” way. One throws in order to hit a teammate’s hands, for example; throwing at her feet is inefficient pursuit of the goal. We could say the “right” way to do such things is the efficient way. Finally, the activities assessed are intersubjectively observable. While the questionnaire asks for the respondent’s beliefs, there is nothing special about first person access to handedness. In innumerable studies an observer performs the assessment. This is because handedness is presented visually when the hands are used. Thus, the conceptualization of hand use in HUM indicates governing values of commonness, ends, efficiency, and intersubjective observability.

We must next consider further the meanings of “skill” and “preference” in this context. It is not uncommon for a questionnaire simply to ask: “Which hand do you prefer for the following activity?” (Oldfield, 1971). Annett (1970) asks for the hand you “habitually use.” Veale (2014) speaks of preference in hand use. Peters (1998), among others, notes ambiguities in how questionnaires ask about hand use. Preference is a matter of which hand one uses, and skill is a matter of how well one uses it. While factors ranging from features of the environment to one’s own level of ease and comfort influence skills and preferences, these terms would benefit from further explanation to clarify their meaningfulness for the concept of handedness (Annett, 2002, p. 37). We can parse out a few different modes of skill and preference which allow us additional clarity regarding how HUM conceptualizes handedness.²

Functionality

“Functionality” characterizes handedness as being better generally at doing various commonplace things with one hand rather than the other. Better here means more capable of accomplishing the goals of one’s activities. To

between strong left and strong right, with several varieties of mixed-handedness in between.” Annett proposes several groupings of handers based on the nexus of skill and preference (pp. 31–45).

²We can readily envision how skill and preference complement each other. One might express a preference to paint right-handed because one is more skilled at painting with that hand. More generally, if use is a matter of driving towards a goal, then using the more skilled hand would aid in that pursuit. This is not to say that skill and preference must occur together. I seek only to clarify the conceptual fit between skill and preference vis-à-vis hand use, which explains why these ideas recur in the literature.

say I write better with the right hand is to say that I form the letters more legibly, faster, with fewer spelling errors, etc. To say I throw better with the right hand is to say that I throw with greater velocity, more accurately, farther, and the like with the right hand. (See, for example, Flindall, Stone, and Gonzalez (2015), Stone and Gonzalez (2015), and other literature on grasping and grip aperture, and also Masud and Ajmal (2012).)

Frequency

According to “frequency,” to be handed is to use more often one hand rather than the other across various activities. To be right-handed, then, would be to drink from a glass, pick your nose, brush your hair, and so on more often than not with the right hand. EHI, for example, asks which hand is preferred for an activity, and asks if the other hand is ever used, so all studies using EHI employ this mode.

Dominance

Hand dominance can mean to use one hand more commonly, but it can also mean, while undertaking bimanual activities, that one hand rather than the other is “in charge” and the other hand has a subordinate role. For example, to drive right-handed would mean that when steering the right hand gives more direction to the vehicle, even though both hands turn the wheel. To hug right-handed would be to grasp more firmly with the right hand or to pat on the back with the right hand or to reach to grab your partner with the right hand higher than the left, even while squeezing with both hands (Shen & Franz, 2005).

Choice

The “choice” version of HUM determines one’s type of handedness as a matter of which hand one opts to use in a situation. If you give me various tasks and I choose to do them mainly with the right hand, I have expressed a preference for right-handedness. The choice could be implicit or explicit, a matter of a conscious decision or a mere response to a prescribed task. You offer me a gun and say, “shoot.” I pick it up with my right hand and wrap my right index finger around the trigger. I have expressed a choice to fire the gun with the right hand, and thus displayed right-handedness (e.g., Stone & Gonzalez, 2015).

We can now elaborate with some detail HUM’s conceptualization of handedness. Functionality, frequency, dominance, and choice appear as modes to describe handed behaviour. These modes are possible because they assess hand use in accordance with commonness, ends, efficiency, and

intersubjective observability. These modes, that is, suit the values implicit in the ways that EHI and the like identify and assess handedness. Indeed, once we conceptualize handedness in terms of hand use, categorizable along a spectrum and identifiable through certain kinds of behaviours, these modes present themselves as the effective ones for understanding what is meaningful about handedness, because they realize the nature or essence of handedness, which is to be, with some consistency, left or right-handed; that is, to use, or to express the preference or ability to use, the left and/ or right hand across a broad range of common, ends-directed, intersubjectively observable activities. This is the complex conceptual nexus HUM provides. This is how these concepts fit together as a framework for scientific research, which gives parameters for how to design experiments. This is what the essence of handedness is for this model.

Two other ideas informing HUM are uncaptured thus far. First, HUM is supposed to tell us something about the individual's brain, as handedness is a mode of access to the individual's interior biology and associated mental structures. Second, HUM should tell us something about the experience or feelings of the handed person, or about her self-understanding. Now, I do not mean that someone's handedness should tell us if she is, for example, creative or a type A personality. I mean that when the model assesses one as right-handed, it should indicate that one feels or experiences oneself as right-handed. This point is vital, because it reminds us that handedness is important not merely as a way we do things, but as a way we experience and understand ourselves. It is not merely a moment of our behaviour or an effect of our brain development, but an active component of one's existential identity: the role that handedness plays in how we conceive of ourselves and our worlds, implicitly or explicitly, is as valuable as how we use our hands. That I think of myself as left-handed and organize my world in that way demonstrates ways my environment and body are meaningful to me in my experience of myself as an agent. Identification of handedness, then, has significance because it should pick out features relevant to an agent's self-understanding, existential identity, or authentic self, and not only because it can indicate features of hand use that accord with types. The focus on behaviour is, in this regard, a facile technique to measure and respond to a larger moment in our agency.

HUM has many strengths. For one, it fits our folk or "common sense" practices for understanding and identifying handedness. After all, we are not looking for subatomic particles, but for a conceptualization of a phenomenon we all experience. Folk talk about handedness, moreover, is often intended to identify one as handed in relation to a pure type. One might talk about being a switch hitter in softball to say, "Yes, I am right-handed, but sometimes I do things left-handed, so I am not as dominantly right-handed as some other people are or as I may appear to be." Such identification, moreover, would

seem generally to correlate with how we feel about or experience our handedness.

Other benefits appear for scientific research. Because there is widespread correlation between handed activity and the feeling of handedness, we can infer that we do not even need to address feeling in the study of handedness. The feeling would be redundant. We can stick to observable behaviours, which we can measure: a boon for empirical science. Surprises in assessment (perhaps: “She thought she was quite dominantly right-handed but the data say otherwise”) can be quite interesting and relevant for both scientific and self-knowledge. Finally, the tight fit between the assessment of handedness and its conceptualization means both that the phenomenon of handedness is never far from reach during theorization and interpretation of data, and that experimental design has a clear focal point: if the experiment is veering away from handedness as skill and/ or preference give it, it fails to track its subject matter.

Nevertheless, we need to investigate weaknesses in HUM. I argue in the next section that one particular weakness, a bias towards right-handedness, is a potentially major difficulty for HUM’s conceptualization of handedness.

Critical evaluation of HUM

HUM seems to reduce the concept of handedness to instances and types of hand use. Philosophy has demonstrated that defining a concept via instances or types can be problematic (Plato, 2002). We might fairly wonder if this tight focus on hand use alone may lead to overlooking other features relevant to the concept of handedness. The philosophical discipline of phenomenology can help us think through this concern.

Phenomenology is the study of experience as it is lived in the first person perspective (Smith, 2013). When Edmund Husserl introduced phenomenology, his method, roughly, was first to bracket or ignore the “real” or “external” world in order to focus on experience itself, and second to bracket the content of experience in order to isolate the structures that make experience possible (Husserl, 1983). Intentionality is a key structure this approach puts into view. Intentionality is the directedness of the experiencing agent towards the world: in other words, consciousness is, by and large, consciousness of or about something. Although it appears in mental content, intentionality is not merely content: like space and time, intentionality structures experience and makes its content meaningful. (For example, one’s directedness towards the world in a task like building a cabinet structures one’s experience of what one is doing and gives meaning to tools, wood, etc.) Later philosophers analysed intentionality specifically as a structure of bodily experience (Merleau-Ponty, 1945). Our lived experience of a task like washing dishes, for example, is of the body immediately, unthinkingly directing itself so that

it can best approach the situation: taking a certain posture before the sink, picking up a dish with one hand and scrubbing it with the other, holding the dish at a specific distance and angle so the eye can search out traces of stains, and all of this in an automatic kind of way. When we look at such examples we see intentionality is a guiding thread that not only directs the mind but “gears” the body into the world. That the body structures or “schematizes” itself and the world around it in order to gear itself into the world and accomplish its tasks: this is the central insight and bedrock of phenomenology of the body.

Notice that it is by studying the use of the body that phenomenologists come to grasp the structures of experience. Another example may help clarify the role of the body in phenomenological inquiry. Consider listening to a melody. One could describe listening by discussing the biology of the human ear. This approach would tell us something about the biological basis of the experience, but not about the structure of the experience itself. The phenomenological approach, by contrast, would ask: what are the conditions on experience that make it possible for one to experience a set of tones as a melody, and not simply as a set of tones? Describing the biology of the ear does not get us closer to the answer. Instead, we must recognize that, to experience tones as a melody, we must at once retain the existing tones in sequence while anticipating subsequent tones. This tells us something valuable about the structure of human experience: it generally has some short term temporal duration or unity, which allows the experience to be a meaningful unit. Without duration, melodies (and other events that exist across short term time) would not be recognizable (Husserl, 1990).

The melody example also exhibits the role of lived experience in philosophical phenomenology. Lived experience is a tool to refocus analysis on the structures of experience that make experience possible: in this case, duration. The content of the lived experience, the melody, is not the focus of phenomenological investigation. Still, notice: phenomenology does not deny the value of how the body is used. It is just that use is not the end-all of the analysis: the structure of experience is.

After phenomenological inquiry locates and defines a structure of experience the cognitive scientist has something useful: one could seek out brain features correlating to the experience of short-term temporal duration, for instance. Understood this way, phenomenology’s targets and goals are not much different from those of many laterality researchers, who examine the use of the hands in order to find underlying structural features of human beings. Phenomenology and empirical science are perfectly complementary, and the results of empirical research are the impetus for new phenomenological analysis and vice versa. Indeed, phenomenology has recently gained much mainstream appeal at the intersection of philosophy of mind and cognitive science (Gallagher and Zahavi (2007) provides several critical

assessments of phenomenology. See also Gallagher (2003)). It has, at the same time, shown utility in studying sex and gender, racial inequalities, and disability, where it does great work in determining structures of experience relevant to human difference (Alcoff, 2006; Toombs, 1995; Young, 2005). It should be able to benefit laterality studies similarly. However, no philosopher has produced a phenomenological investigation of handedness. (Derrida (2005) and McGinn (2015) discuss hands, not handedness. Todes (2001) discusses front-back and top-bottom bodily asymmetry, but not lateral asymmetry. Manderson, Bennett, and Andajani-Sutjahjo (2006), Masud and Ajmal (2012), and Misigo (2015) reference lived experience and phenomenology but do not move from discussion of lived experience to a structural account of experience.) The following phenomenological analysis, based in my own lived experience of handedness, aims to correct this oversight. It provides positive content for the concept of handedness and a basis for critique of HUM.

Problem case

I exhibit the following traits. I use a computer mouse right-handed. I cut asparagus right-handed. I open jars right-handed. But these are not obviously expressions of my hand preference or skill. Computer mice, knives, and jars are, overwhelmingly, right-handed objects.³ I use my right hand to do these and other things in order to accommodate how the world is constructed. If you saw me going about my normal day, you might say, “He is right-handed.” When I take an EHI, depending on my mood and memory, I assess as quite inconsistent: usually as weakly right-handed or weakly left-handed (on my most recent taking of the Cohen (2008) version of EHI I came out –20 or middle decile).

Now, bracketing activities in the world, if you asked me about my lived experience of my handedness, I would tell you I am strongly, consistently left-handed. I would respond to claims about prevalent right-handed behaviour with humour and light indignation. I would emphasize the things I do left-handed, leisure activities like playing catch or intimate moments like holding my child’s hand when crossing the street, as evidence of my “true” handedness. My immediate, apparent approach to the world as a right-hander, I would say, is pragmatic *in situ*. Regardless of the activity, though, I always

³Computer mice are usually presented on the right side of the body. The mouse has buttons that click easier with the right hand. (It is true that some mice are designed symmetrically, and others can sometimes have their clicking functions reversed, so that clicking the left side will do what clicking the right side normally does, though the fact that terms like “right-click” mean what they mean suggests how deeply mouse use is right-handed.) Knife blades are often made for cutting with the right hand and are often presented on the right side of the body. Jars are designed to open by turning counter-clockwise, a motion performed more capably by the right hand.

experience myself, in my ownmost, authentic self, as strongly, consistently left-handed.⁴

Next, we bracket the content of my lived experience. Two structural features of experience present themselves. First, a bias towards the right hand or *dexterocentrism* structures, to some unknown extent, my experience of the world. Just as important is *dexteronormativity*: that is, in experience the world prescribes to the human body that it will best live in the world through right-handedness. In other words, not only is the world experienced as set up for use by the right hand, but one “should” use the right hand to engage the world.⁵ These structures or conditions of experience are distinct, but interconnected. For instance, many wristwatches have a knob on the right side, which is for use by the right hand while the user wears the watch on the left wrist: this is dexterocentrism. It is dexterocentrism not because the object is right-handed. Wristwatches are designed that way because the world is full of right-handed persons and caters to their needs. The design is an instantiation of a global, right hand bias that is a structural feature of experience. Moreover, the design of the watch dictates how the watch should be worn, even if you are not right-handed: this is dexteronormativity, again, not just because of the convention of how to wear a watch, but because that convention is an instantiation of a global, right hand bias that is a structural feature of experience. The indication, of course, need not be and often is not taken. However, dexteronormativity is sometimes given forcefully, like the norm of shaking hands with the right hand. Extending the left hand signals confusion, disrespect, or impairment of the right hand. Forced conversion of the writing hand from left to right is another infamous example of dexteronormativity in action. This is to say that dexteronormativity may be strong or weak. Regardless of the strength of the prescription, dexterocentrism and dexteronormativity significantly structure everyone’s experiences, whether they recognize it or not. This structure is so pervasive that people like me continue to deploy our right hands even for tasks that are not themselves dexteronormative. For example, I unthinkingly use a knife with the right hand even when my left hand is free. In sum, dexterocentrism does not just mean that certain

⁴In folk talk about handedness, one would say I am very much left-handed, even if my behaviours do not necessarily justify this assessment. My self-reports of my experience of my left-handedness, and the fact that I must accommodate myself to a right-handed world, seem to matter more than my behaviours do in folk talk about handedness just because we all know that left-handers experience right hand bias in our environments, and therefore self-report of experience is relevant (although perhaps not definitive) to understanding the left-hander’s handedness.

⁵This is a hypothetical imperative sense of “should” and normativity, not a moral sense: “If you want to do this activity (or do it well), you should do it with the right hand.” It is also a kind of cultural norm: “Around here, we do this activity with the right hand.” Because right-handedness is normative across all cultures, however, the convention of right-handedness as normative is general. Moreover, because left-handedness has, throughout its history, been considered morally worse than right-handedness and even evil, there is a persistent concern about moral imperatives when considering normativity and handedness.

activities or moments of experience are right-handed. It means that a right-handed orientation pervades the implicit structure of one's experience generally. (Compare McManus, 2002, chapter 11. Masud and Ajmal (2012) discusses self-suppression of left-handedness in Pakistan, where prejudice remains influential. Compare Fanon (2001) on the fixity of racialized identity outside of racialized contexts and Young (2005) on the fixity of feminine body comportment outside of sexist contexts.)

The procedure thus far has been to characterize some of my activities in the world and bracket that, then characterize my lived experience of those activities, and then bracket that. This allowed identification of dexterocentrism and dexteronormativity as features that structure experience. However, we know these conditions are not peculiar to me: it is merely that my particular case allows us to see them for what they are, as structures of experience rather than as mere content of instances of experience. Indeed, dexterocentrism and dexteronormativity structure every agent's experience of the world, regardless of the agent's handedness or her explicit reckoning of her experience (assuming the agent is handed, has certain cognitive capacities, etc.). Consistently left-handed or right-handed persons are subject to the same structures. In sum, the case, by beginning from a phenomenological perspective, allows us to rethink dexterocentrism and dexteronormativity, not only as problematic to identifying hand usage tendencies or as inherent to various objects, but as structural features of the world of human experience that condition how that experience is for everyone.

To be clear, I am not arguing that folk psychology should trump empirical science. Phenomenology is not folk psychology. It is a philosophical method for identifying the structures of experience, not a report of personal opinions about this or that. There is nothing "subjective" or opinion-based about phenomenology's results (indeed, Husserl developed phenomenology in order to avoid such issues). This is because it is not the content of the experience that matters but the structure of the experience, which is the same for all persons appropriately situated. This is to say that the result of a phenomenological investigation is not further data, but descriptive categories that correlate with empirical research and may be used to improve the design of empirical studies by providing new contexts for proven research, new partial frameworks for further research, and new possibilities for experimental design.

In this case, dexterocentrism and dexteronormativity allow us to resituate right hand bias as a structural feature of experience that influences hand use in ways that may bias the results of assessment protocols like EHI, especially when it comes to inconsistent left-handers. We have seen that some left-handed people simply do things right-handed even in situations that do not require it; thus, right hand bias potentially shapes any analysis based in hand use. So, while one can mitigate bias, perhaps by avoiding asking about dexterocentric activities on questionnaires, there is simply no

eliminating it altogether. I take it that in some respects this concern is well known. This is a good thing, because we should want phenomenological analysis to complement scientific research. In this case, phenomenology, by rethinking dexterocentrism, articulates and develops an accounting for the extensive presence of dexterocentrism in the assessment of handedness: dexterocentrism is part of the structure of hand use.

A further consequence: the assumption of a correlation between hand use and the experience of handedness needs support. With inconsistent handers we should not assume that extensive use of each hand means experiencing oneself as weakly handed. Indeed, the case suggests that this assumption may hold only for consistently left and right-handed persons. When you are consistently right-handed and live in a dexterocentric, dexteronormative world, you prefer to use the right hand, you are better with it, and you feel right-handed. This accounts for perhaps 69% of persons. When you are consistently left-handed, which constitutes perhaps 3–4% of left-handers, your hand use and experience line up despite dexterocentrism (Annett, 2002). For inconsistently handed persons, including the majority of left-handers, we need not assume these links.

We may now broach a more startling argument. HUM conceptualizes handedness according to hand use. Hand use is systematically biased towards the right hand through dexterocentrism and dexteronormativity. Thus, HUM conceptualizes handedness according to right hand biased hand use. This means HUM's concept of handedness is right hand biased. We might say: HUM's concept of handedness confuses handedness with right-handedness. This is a much deeper problem than the concern that hand use-focused assessment is dexterocentric, or that persons may be coded as inconsistently handed although they experience themselves as strongly handed. The argument is that dexterocentrism is built into the conceptual apparatus of HUM itself, and for that reason it cannot adequately conceptualize handedness in general or exclusive of bias. We cannot define handedness merely with instances and types of hand use. The phenomenon includes more than this.

Indeed, once we question hand use as the paradigm of handedness, the associated conceptual nexus springs myriad leaks. Obviously, if we consider first person access to self-experience valuable, then we can problematize the importance afforded to intersubjective observability, which complicates (though obviously does not negate and ultimately, as I have proposed, should complement) the centring of the science of handedness on observable behaviours. Going further, HUM's focus on daily, pragmatic activities obscures the relevance of other activities, like leisure activities or those that are unusual or especially important to the agent. Such activities are often more meaningful to agents than quotidian ones and thus may merit special weight in assessing handedness, and they are often not efficiency-governed. Efficiency

appears to be a capricious value for assessing handedness, as does use to accomplish a goal rather than for other reasons like unstructured play.

At this point, we can see that HUM has some significant conceptual defects, and that phenomenology can offer valuable contributions to laterality studies. Phenomenology provides new contexts for envisioning right hand bias, which allow growth in thinking through the theoretical underpinnings of research into handedness: especially, it exposes the build of right hand bias into the concept and assessment of handedness. As a result, phenomenology may have an effect on experimental design, asking researchers to consider further the ways that right hand bias affects the theoretical backdrop of their studies as well as their results. Researchers may wish to reconsider the use of protocols like EHI and design questionnaires more stridently aimed at reducing bias, for example. They should, especially, feel invited to consider the ways in which right hand bias influences the behaviours of left-handers to parallel or fail to parallel those of right-handers, and make use of these insights in experimental design. However, since right hand bias is so pervasive that it structures the concept of handedness itself, we may need to abandon EHI and the like altogether and reconceive how we think about handedness with some distance from hand use as the dominant criterion.

But we should not move too quickly. Let us consider objections to putting so much stock in this problem case and in phenomenology.

Objections

Objection 1: The case is an outlier not relevant to the general concept of handedness

One appropriate kind of objection to a phenomenological case has the following form: the case in question is an outlier, and thus is not particularly relevant to forming a general concept. In this case, the concern would be that my experience of a strong feeling of left-handedness coupled with assessment as inconsistently handed is very, very uncommon, and thus not relevant to forming a general concept of handedness.⁶

One line of response would show that my experience is not so non-normative as to defy appropriate inclusion in a concept of handedness. Annett (2002, p. 33) reports that 3–4% of all persons are consistently left-handed, while 9–11% of all persons are inconsistently left-handed. Thus, if only half of inconsistent left-handers experience themselves to be strongly left-handed, this still would be a 4–5% of all persons, a sizeable chunk of the left-handed population. Papadatou-Pastou et al. (2013, Table 2) shows that many more persons who self-report left-handed assess as right-handed on

⁶I have already outlined a second line of response, which is that the structures I identify hold for all persons, not merely for persons like me.

questionnaires than vice versa (see also Steenhuis, Bryden, Schwartz, & Lawson, 1990). Such self-reports would be quite strange if the feeling of left-handedness were not strong. Flindall et al. (2015) tested 21 self-reporting left-handers, and based on the EHI/Waterloo handedness questionnaire, 4 of them (19%) were classified as mixed. Here, again, in small numbers, evidence of persons who feel left-handed enough to self-report as left-handed but assess as mixed handed. There are also, of course, persons who encountered forced conversion to right-handed handwriting, but experience themselves as left-handed despite their frequent use of the right hand. (See Masud & Ajmal, 2012. Manderson et al. (2006) discusses “Geoff,” who because of illness changed from consistent right-handedness to inconsistent handedness, but still experiences himself as strongly right-handed.) Finally, there is some evidence that left-handers experience their left-handedness with more intensity than right-handers do (Casasanto, 2009, p. 11). This indicates that the intensity of one’s experience one’s own handedness may not track consistency of hand use. Suppose, then, something on the low end: 2% of all persons self-report being strongly left-handed but assess as inconsistent or right-handed. This ends up being some 140 million people worldwide, or more than double the UK population.⁷

Objection 2: Bad faith and the like

There is a well-known tendency in the folk notion of left-handedness to celebrate it. Left-handers are purported to be smarter or more creative, for example. This tendency, combined with a tendency to think handedness in terms of a left-right binary, may lead persons to want to understand themselves as strongly left-handed, even when they are not.

Consider this case of self-deception for comparison. Zara considers herself a fiscal conservative. Yet she donates to political action committees that lobby to increase government spending, votes for politicians who raise taxes, and engages in other fiscally liberal behaviour. Given her actions, we might think Zara’s self-assessment is mistaken. There might be some conceptual confusion about what she truly believes. She might be in bad faith. Whatever the reason, her expressions conflict with her beliefs.

People exhibit such discrepancies frequently, and in these cases we tend to think that actions matter more, or are more defining, than words and feelings are. We would want to say that Zara is actually a fiscal liberal, despite her beliefs. Now back to me: Am I “really” inconsistently handed, despite my beliefs? Is my self-assessment mistaken? In comparison with Zara, because

⁷Worth noting: in other circumstances small populations are treated as relevant in concept formation. About 0.3% of adults in the US are transgender, and 3.5% identify as lesbian, gay, or bisexual, but we would not find acceptable a definition of sexuality that only applied for cisgender or heterosexual persons (Gates, 2011).

“actions speak louder than words,” it would seem I am wrong and “should” change my self-assessment. More importantly, it makes us think that hand use truly is definitive of handedness, and that diverting the focus to the experience of handedness leads us astray.

The “actions speak louder” principle, however, needs justification. Thus, another case.

Objection 3: Reconfiguring self-assessment

Consider this case. Tisha feels she is bad at parallel parking, yet she expertly parallel parks every time. Eventually, she realizes: “I am good at parallel parking. My feelings are inaccurate.” She finally even comes to feel and believe that she is good at parallel parking, and at that point her experience of herself matches how she actually behaves.

Whereas Zara, the avowed conservative, could recognize her errors and change her habits to become a person who acts in keeping with her ideas, Tisha seems only able to close the gap between self-assessment and fact by changing her self-assessment. We cannot even suppose that Tisha could become a bad parallel parker, and thus match facts to beliefs. Barring some dramatic change, she simply is a great parallel parker.

Whereas the Zara case seems arbitrary, and thus the inconsistency can be resolved by changing either actions or beliefs, the Tisha case is non-arbitrary, and only changing her beliefs can resolve it. This serves as justification for the “actions speak louder” principle. Moreover, we might think that my case is like the Tisha case. I am in fact adept with my right hand. Notice also that Tisha’s error is over a skill in spatial deployment of the body, just as mine would be. Even in self-assessment of our own bodies we can be radically mistaken, and we can make adjustments to our beliefs so they track the truth.

A facile response to such objections is that they are orthogonal to this paper. The paper argues that a problem case reveals conceptual issues for handedness. Everyone like me in the world could be in bad faith, self-report deceptively, etc., and the point would still hold. This is because phenomenology is not a matter of opinion. The structural features it reveals are present regardless of whether I am right or wrong about my lived experience. Hand use is not all there is to handedness, and focusing on use alone does not get us to the experience of handedness as a wider phenomenon.

However, let us treat the objection as relevant. I still think we should resist saying that my self-assessment of my handedness is wrong. All things being equal, I would use my left hand, but all things are not equal. My actions speak not from me, but from dexterocentrism, which masks my “true” handedness. To assess me by my actions is to address my situation, not to address my handed being per se.

Nevertheless, the larger point is well taken. Actions *do* play a significant role in conceptualizing handedness, and we should not write them out of the picture just because there is some corruption in the data. Handedness is about how we engage the world, not simply how it feels to engage the world. This is surely correct. Indeed, phenomenology takes flight from how we actually use our bodies in the world and does not seek to erase corrupted data, but to explain them.

My point: handedness is a complex phenomenon, informed by hand use, the experience of hand use, and the structure of experience. HUM is simply not able to account for experience as well as it seems, and thus allows the error of reducing handedness to instances of handed behaviour, which are in turn subject to right hand bias.

Objection 4: Corruption is inevitable

The critic worried about corruption may not yet be satisfied. She could note that handedness is a socialized activity, and thus it is the socialized development of handedness that counts as “true” handedness and ought to be reckoned in the concept of handedness. We all know that socialization involves right hand bias. Let it show up in the concept.

There is something quite fair in this objection. To isolate “pure handedness” is a fool’s errand. If we want a robust concept of handedness, then dexterocentrism must be a feature of it: it is part of the structure of experience. As a practical matter of doing science, research that admits dexterocentrism and dexteronormativity as factors in its results is surely appropriate. Such research, like that done with standard surveys such as EHI, should note these factors.

I take it, however, that most research uses EHI because it wants to parse out left and right as “truly” left and right (e.g., Dragovic, 2004; Milenkovic & Dragovic, 2013; Peters, 1998). Because Objection 4 does not match up with how researchers seem to think about their projects, there are still good grounds for rethinking our conceptualization of handedness.⁸ In addition, this criticism says nothing to the problem of the reduction of concepts to instances and types of use that HUM generates.

Objection 5: Biased results are useful

We can imagine that dexterocentric results, because they reflect biases, can be really useful. This is quite possible. However, it does not change the facts: handedness, tied as it is to hand use, is a right hand-biased concept masquerading as a neutral one.

⁸Moreover, the objection runs counterintuitively to the normal way we talk about handedness, which makes great use of the feeling of being handed and what that experience is like, and especially regarding left-handers we tend to think that dexterocentric feedback should not be taken as accurate.

Objection 6: Self-reports are inaccurate

A perceived deficiency in the ability of persons to self-report their handedness prompts the need for questionnaires (Coren, 1993).⁹ It may seem that my proposal is a retrograde failure to recognize scientific fact. However, I have argued only that accounting for the experience of handedness is valuable, not for the total dismissal of behaviour-focused questionnaires. Since there is much dispute about how to produce and use these questionnaires anyway, I present nothing unusual in that regard.

Objection 7: Quotidian results matter more

One might object that quotidian life should matter more to assessing and conceptualizing handedness than extraordinary circumstances. After all, these are the things we do all the time. My case has a couple of lines of response. First, the quotidian is right hand-biased, so investigating it may not give an accurate assessment of non-right-handedness. Second, the value we place on unusual circumstances seems remarkable. Suppose you assess as inconsistently handed. A child near you is in danger. All things equal, you reach out with your left hand to rescue her. This kind of experience, we might think, confirms left-handedness, as when it really mattered, or when engaged in an immediate, unreflective act, you acted with the left hand. The frequency and “quotidianness” of the quotidian, in other words, are not enough to justify it as more valuable to assessing and conceptualizing handedness than the uncommon or extraordinary.

Objection 8: Malleability of use and feeling

Handedness is something that it seems one could change. A right-handed person, for instance, could find her hand disabled, and take to using the left hand. She could, over time, come to experience herself as left-handed. There is thus a malleability of use and feeling: we need not believe that either is a stable indicator.

I am perfectly happy with this objection. Nothing in my thesis claims that handedness must be permanent, and there are persons for whom it is quite unstable. The point, rather, is that from hand use alone we cannot conceptualize, or in certain cases identify, handedness.

Discussion

Handedness is broader than hand use. There is significance to the first person experience, over time, of the interaction of hands and world. There is a feeling

⁹A question like “Are you right or left-handed?” is deeply ambiguous, which I take it is the point of this observation, not that persons are unreliable in reporting how they experience their handedness.

of “mineness” in the experience of handedness, which includes not merely that the hands “belong” to the agent, but that they *express* one’s agency as one gears oneself into the world. Indeed, handedness is a fundamental mode of spatial orientation.

A careful study of lived experience seems crucial to determining, if it is possible, a general concept of handedness. In other words, we need to think of the hand not merely as a tool to use, but as an elemental moment in the structure of our lived experience, which we can characterize by careful analysis of the lived experience of the unique meaningfulness of the hands and handedness in the schematization of the interdependence of self and world. Thought this way, handedness shows up as a mode of bodily orientation, physicality, and first person intentionality. It tells us something valuable about how the self constitutes its lived experience of space and expresses itself meaningfully in that space. This is the broader concept of handedness that the results thus far signal. It is replete with structures for thinkers to identify and analyse.

The growing body of kinematic research on grasping presents a promising starting point for further phenomenological research (Boulinguez, Velay, & Nougier, 2001; Bryden, Mayer, & Roy, 2011; Flindall et al., 2015; Gonzalez & Goodale, 2009; Peters, 1990; Shen & Franz, 2005; Stins, Kadar, & Costall, 2001; Steenhuis & Bryden, 1999). It shows that right-handers, at a remarkably high percentage of their population, reach for things with the right hand, while the left hand stabilizes objects or otherwise readies itself to “assist” the right hand in a “hovering” or resting position in front of the body. This gives us an interesting image of what hand specialization means for posture. A hovering position means a bent elbow and wrist, whereas a reach straightforward means a straightened elbow and wrist (see the pictures in Stone, Bryant, & Gonzalez, 2013, or compare to the classic understanding of left-handed handwriting with a hooked wrist and right-handed handwriting with a straight one). Consider also: returning to the body means for the right arm a movement directly backward into the body, while for the left arm it means a movement outward, to the left side of the body, as the shoulder rotates and draws backward. The two arms operate with differing postures and movements.¹⁰

Now, remarkably, a significant percentage of left-handers grasp with the right hand, depending on the task. Thus, the movement of grasping and accompanying postural asymmetry holds widely, with the possible exception of the subcategory of “mirror image” left-handers. The right arm, for many, is the arm for acting out into the world. (These results are linked to visual

¹⁰“Taken together, these results support the postulation that left-handed individuals are not always mirror images of right-handers, nor are they always identical to right-handers in terms of kinematic behaviour; rather, they represent a heterogeneous population in terms of degree and direction of functional lateralization.” (Flindall et al., 2015, p. 298)

processes and vary according to task. Stone and Gonzalez (2015) summarizes the literature, including a right-hand “grasp to eat” advantage in grip aperture regardless of handedness (Flindall et al. 2015); “an advantage in planning the movement for the right hand ... in both [left and right-handed] populations” (Janssen, Meulenbroek, & Steenbergen, 2011); the left hand (regardless of handedness) is slower to reach a target and more likely to overshoot it (Adam, Müskens, Hoonhorst, Pratt, & Fischer, 2010); a surprisingly high percentage of tested left-handed populations who prefer the right hand for grasping (Gonzalez & Goodale, 2009). Further indirect evidence: left-handers, especially consistent ones, tend towards “avoidance” behaviour, while right-handers tend towards “approach” behaviour. See Hardie and Wright (2014) and Wright, Hardie, and Rodway (2004)).

Nevertheless, some persons prefer to act into the world with the left arm across a variety of activities, including approach activities (Brookshire & Casasanto, 2012). But, as we have just discussed, the left arm has tendencies in motility that differ from the right arm. What we should have, then, are different modes of spatial orientation in the world. Generally speaking, those who “lead” with the right arm would do so with a rather straightforward motion, while those leading with the left arm would make greater use of lateral space.

What a phenomenologist sees are behaviours that indicate differing lived experiences of lateral space. The left-hander experiences the deployment of herself in space with greater lateral potential than the right-hander does. Her arm encounters the world at once from both the front and the side. She will, therefore, experience personal lateral space differently than the right-hander does. On the one hand, limits to lateral movement affect her much more. On the other hand, she will take advantage of lateral space more readily when allowed. Anecdotally, we know there are differences in lateral space use between left- and right-handers. In Western formal dining, lateral space is constricted and left-handers are known to be seated at the left end of the table so their elbows do not bother other diners. In fencing, left-handers have advantages facing right-hander fencers, perhaps because they use lateral space to strike the outside of the opponent’s body more readily than their right-handed counterparts.¹¹

These are experiences of both confinement and freedom unique to the left-handed agent, which point to something crucial to handedness studies. It is not just *which* hand someone uses for spatial orientation, but *how* one uses that hand, that matters. This being the case, elemental moments of handedness, how it shows up for various individuals, and how it provides meaning for us all, are relatively untapped, but matter deeply for the schematization of

¹¹ refer here specifically to epee fencing where striking any body part counts for a point. My findings on the fencing talents on left-handers result from informal conversations with members of my university’s fencing team and are different from, although do not necessarily conflict with, speculations on this topic in Harris (2010), which tentatively align the advantage with brain function.

the interaction of hands and world and the gearing of persons into environments. Without a fuller account of the asymmetries of lived experience between left and right-handers, we will not have an adequate understanding of the meaningfulness of handedness or the best ways to conceptualize it.

Acknowledgements

Thanks for comments to audiences at the MidSouth Philosophy Conference and at the University of Florida's Center for the Humanities and the Public Sphere. Thanks to Robert D'Amico, Hajar Kadivar, Chris Lay, Jeff Ogle, and Kyle Whyte, for feedback on earlier drafts of this paper. Thanks to Chris McManus, Scott Hardie, Lynn Wright, and an anonymous referee for comments that strengthened this paper during the review process at *Laterality*.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by the Center for the Humanities in the Public Sphere at the University of Florida under the Rothman Summer Fellowship.

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