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Review article

The fluidity of biosocial identity and the effects of place, space, and time

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ABSTRACT

Public and scientific conceptions of identity are changing alongside advances in biotechnology, with important relevance to health and medicine. In particular, biological identity, once predominantly conceived as static (e.g., related to DNA, dental records, fingerprints) is now being recognized as dynamic or fluid, mirroring contemporary understandings of psychological and social identity. The dynamism of biological identity comes from the individual body's unique relationship with the world surrounding it, and therefore may best be described as biosocial. This paper reviews advances in scientific understandings of identity and presents a model that contrasts prior static approaches to biological identity from more recent dynamically-relational ones. This emerging viewpoint is of broad significance to health and medicine, particularly as medicine recognizes the significance of biography – i.e. the multiple, dense interactions imparted on a body across spatio-temporal dimensions – to phenotypic prediction, especially disease risk.

1. Introduction

Identity, and its relationship to individual uniqueness, has been among the most debated concepts in both the social and life sciences (Hall and du Gay, 1996; Clarke, 2010; Durante, 2013). Identity is a field-specific concept with its meaning shifting drastically not only between the social and life sciences, but also within disciplines due to differing epistemologies, methodologies, and scopes of research. In common parlance, identity can evoke a sense of distinctiveness, coherence, and singularity: What makes me, me, and you, you? Such questions may be answered via shared notions of social difference (e.g., race, ethnicity, gender, religion), through a rich description of characteristics and habits, or through appeals to one's biological uniqueness (e.g., their fingerprint or DNA profile).

Yet, the rise of new biotechnologies may fundamentally change the way we perceive identity. Social theorist Nikolas Rose argues:

> We live, according to some, in the century of biology where we now understand ourselves in radically new ways, as the insights of genomics and neuroscience have opened up the workings of our bodies and our minds to new kinds of knowledge and intervention (Rose, 2012: p. 1).

It is clear that recent advances of tools, resources, and knowledge in the life sciences have made bioinformation distinctly more accessible to laypersons via public databases, the internet, mobile apps, and personal biotech companies (Postan, 2017). In this paper, we provide a conceptual framework for understanding identity in the context of this century of biological enlightenment (Rose, 2012; Venter and Cohen, 2004). While we draw key insights from the social sciences, our focus is on the question of biological or, as we would like to more broadly frame it, *biosocial* identity, i.e., who are we in material terms?

The question, "who are we in material terms?" is not meant to negate but rather to reconstruct the so-called immaterial dimensions of identity. For instance, the social and psychological (Roazzi et al., 2013) become material aspects of the body as it experiences life and develops over time (Krieger and Davey-Smith, 2004; Meloni et al., 2016). Also, in congruence with social and psychological understandings of identity, biological identity is much more dynamic than any static genome can represent. Our model presents this dynamism in a way that is directly applicable to the social and biological sciences, with significant relevance to the medical sciences and to both scientific and lay understandings of health and disease. After defining the components of biological, or *biosocial,* identity below, we present a relational model and describe its potential relevance to theory and methods in individualized medicine and clinical decision making (Horwitz et al., 2017a,b).

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1.1. Transitioning from static to fluid frameworks

The definition of identity highlights large philosophical differences between disciplines. Durante (2013) summarizes the conceptual challenges surrounding personal identity by describing two antagonistic theoretical approaches: physical and psychological. Despite diverse thinkers, both ancient and modern, who have readily understood the body as impacted by context (e.g., see Krieger and Davey-Smith, 2004; Warin et al., 2015), physical or biological *identity* (understood as that which offers uniqueness) has often been seen as immutable. In fact, the physical body, while simultaneously understood as adaptable to context, has long been afforded a sense of biological permanence that has strongly informed everyday understandings of identity/difference in physical terms (Nelkin and Lindee, 2004; Turney and Balmer, 2000; see also Gillett, 2011). In contrast, psychological identity has routinely been recognized as less stable and built upon the "intertwined relations of an individual's psychological states" (Durante, 2013). Specifically, the idiosyncrasies that make a person unique (personal identity), have been seen as a process of formation that begins in childhood and spans a lifetime.

Moran (2014) instructs that the notion of identity as a process of (psychological) formation, has a very specific history; prior to Erik Erickson's recasting of the word, "identity" was generally used in science, philosophy, and other kinds of scholarship, in a very narrow sense to refer to the sameness of an entity over time (Erikson, 1956). Moran argues:

> Until the 1950s, or even the 1960s and 1970s, there was no discussion of sexual identity, ethnic identity, political identity, national identity, corporate identity, brand identity, identity crisis, or 'losing' or 'finding' one's identity – indeed, no discussion at all of 'identity' in any of the ways that are so familiar to us today, and which, in our ordinary and political discussions, we would now find it hard to do without (Moran, 2014: 10).

Moran (2014) goes on to explain that the contemporary concept of identity was integrated quickly and furiously into social science and theory, beginning in the 50s and 60s, and then often attributed to earlier writers who had not actually used the word in that way (see also Brubaker and Cooper, 2000). Identity came to be used to describe a more general sense of self, rather than a strict sense of sameness over time, and in so doing, identity emerged as an active "classificatory device" through which debates about group belonging and the "essence" of types of people were waged (Moran, 2014, 6).

Yet, identity as a social concept continued to evolve in the latter half of the 20th century. Without reviewing Moran's careful discussion of the debate, it seems fair to argue that the indictment of "essentialism" (e.g. wrongly attributing an essence to a group or individual) became a common, if not feared, critical impulse in identity scholarship; this critique could easily be avoided, however, by recasting both group and personal identity as malleable, dynamic, contingent, and/or multiple (Brubaker and Cooper, 2000; Brubaker, 2015). The work of prominent sociologist, Zygmunt Bauman (2000, 2004), popularized the notion that identity is *fluid*, relating the fluidity of personal identity to a modern era of rapid change and the ready disposal of things, people, and ideas. This newer notion of identity as *fluid,* or changeable, stuck. While there may still be debate over the analytical significance of a conceptualization of identity that no longer refers primarily to self-sameness or persistence over time, there has been a general acceptance of the fluidity of identity in the social sciences (Brubaker and Cooper, 2000).

Importantly, acceptance of the fluidity of social identity did not negate the validity and significance of social identity writ large; social identities and particularly categories across social difference – race, class, gender, sexuality, ability – are widely referenced. Instead, what the fluidity of social identity has solidified is the (prior) recognition that social identities are context-bound and dynamically contingent to other relationships in socio-space (c.f. Massey, 1997). The performance of gender or racial identity, for example, may differ between home and work or between divergent peer groups (e.g., Pratt, 1998; McDowell, 1999). Accordingly, the individual clearly remains a unique social actor, but their uniqueness and significance for social theory and science does not come from a static social status alone. Rather, social significance and uniqueness emerge from the individuals' relational web of social-spatial interaction, and their performance of identity/difference therein.

Meanwhile, in the life sciences, identity is still largely based on an immutable, static model of individual uniqueness. Many static understandings of biological identity specifically conform to a broader Western framework for science and biomedicine that arguably decontextualized the human body from its relationships with the broader environment for the sake of providing universal understanding of biological mechanisms (c.f. Good & Delveccio, 1993). The supposed static nature of biological identity is historically rooted in well-developed and engrained frameworks (Thurtle, 1996) across several branches of the biological sciences (Clarke, 2010). Static biological mechanisms of identification, including the analysis of dental records and fingerprints (Ohira et al., 2009) and, more recently, retinal scans, voice recognition, and gait analyses have been used and applied in the medical, anthropological, and forensic sciences. Of course, genetics now dominate much of the discourse in defining personal identity (Thurtle, 1996). Since the re-discovery of Mendel's laws in the early 1900's, to the discovery of DNA structure in the 1950's, to the recent development of technologies to readily sequence anyone's entire genome, genetics has provided a clear path to identifying individuals regardless of time and space (Pradeu, 2012). This static genetic identity, based on the centuries-old genetics framework of mapping genotypes to phenotypes, treats DNA as a hard-wired personal signature that defines an individual throughout his/her lifetime. Indeed, DNA identity has become a powerful and universal tool for identity confirmation since its uniqueness can be stated with exceptionally high levels of confidence.

Other disciplines in biology also utilize a static framework of personal identity. As an organ that profoundly shapes personal identity (Feinberg and Keenan, 2005), the brain has recently received a lot of attention with respect to neuro-identity. A study by Bao and Swaab (2011) on sexual behavior and orientation concluded that gender identity and sexual orientation are permanently programmed in the fetal brain due to testosterone level and, thus, not related to social environment. In a very different example, the constancy of biological identity, and the critical role that the brain plays in shaping it, is also evidenced in cases of phantom limb perception: a phenomenon that is experienced by many people after limb amputation where the limb still appears to be present or even hurts (Ramachandran and Hirstein, 1998). Such cases demonstrate that the brain develops a very detailed and stable picture of the corporeal self.

However, not all branches of biology are dominated by a static conception of an individual. Environmental heterogeneity can drive phenotypic plasticity, particularly across developmental stages (Kuzawa, 2005). Many aspects of the human body, such as the immune system, are known to change during the course of an individual's lifetime and, therefore, do not fit into static notions of biological identity. In Pradeu's work (2012) on defining biological identity within an immunological framework, proteins involved in immune response demonstrate "an extremely high degree of phenotypic diversity, [and therefore that] … immune phenotypic characteristics are one of the best ways to distinguish between two individuals" (Pradeu, 2012: 7). This uniqueness holds true despite the fact that the immune system is in constant flux, changing with the antigens it directly encounters throughout life. More recent work by Grignolio et al. (2014) found that continuous changes within the immune system lead us toward a perception of body-based identity as "liquid," corroborating Pradeu's (2012) findings that biological identity cannot be defined by any one of the disciplinary branches of biology alone. In short, the static conception of human biological identity has been definitively challenged