Technology in Society 50 (2017) 66–72

Contents lists available at ScienceDirect

Technology in Society

journal homepage: www.elsevier.com/locate/techsoc

Healthcare framing: Critical realist framing for causal interdependencies and uncertainties within healthcare

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ARTICLE INFO

Article history:
Received 18 May 2016
Received in revised form
30 April 2017
Accepted 3 May 2017
Available online 5 May 2017

Keywords:
Framing
Healthcare
Critical realism
Causation
Uncertainty
Communication
Artificial intelligence

ABSTRACT

Framing of causal interdependencies and uncertainties is important due to factors bringing change to healthcare, such as increasing access to healthcare information via the Internet and increasing self-care. In this paper, it is explained how critical realism can provide a basis for framing causal interdependencies and causal uncertainties within healthcare. The need for critical realist framing of causal interdependencies and uncertainties in healthcare is explained from the perspectives of human to human communication and human to AI communication. An example is provided of critical realist framing for causal interdependencies. Also, an example is provided of critical realist framing for causal uncertainties. Implications are discussed for human to human communication and human to AI communication. Critical realism can provide framing that is easy to grasp and recall. Importantly, critical realist framing can encompass both causal specificity and holistic overview when integrating diverse healthcare options. Moreover, critical realist framing can encompass uncertainties across the "why", "how", and "what" of healthcare. These characteristics of critical realist framing are important as end-users become increasingly aware of healthcare diversity and uncertainty.

1. Introduction

To frame is to draw attention to certain aspects of a topic, while excluding or under emphasising other aspects [1,2]. Basic framing research is carried out in psychology [3–5] and neuroscience [6–8]. Applied framing research has been carried out in the fields of organization management [9–11], mass media [12–14], political science [15–17], and social movements [18–20]. Common across these fields of research are findings indicating that framing strongly influences perceptions, evaluations and decisions [21–26]. With regard to technology in society, framing provides structure for interactions among groups such as technology proponents and potential end-users [27–30]. Importantly, research findings indicate that initial framing can lead to suboptimal decisions throughout implementation. This is because initial framing can provide lasting rationale for pursuing implementation, which can lead to continuing commitment to a failing course of action even when there is little evidence of efficacy in practice [31–34]. For example, healthcare innovations can come to be prescribed widely for many years even though they are no more effective than placebos [35,36].

In this paper, it is argued that critical realism can provide framing structures for causal interdependencies and uncertainties in healthcare. Improved framing of causal interdependencies and uncertainties is important due to converging factors, which are bringing change to healthcare. Firstly, there is growing interest in increasing end-users' health literacy, increasing end-users' participation in clinical decision making, and increasing end-users' knowledge for self-care [37–40]. At the same time, through their use of the Internet, World Wide Web and Social Media, end-users are aware of increasing diversity and uncertainty among healthcare options. Diversity is increased by on-going innovation in biomedical, biopsychosocial, and alternative models of healthcare. Uncertainty is increased by, for example, contradictory biomedical replication studies. Uncertainty is also increased by disputes about the strength of evidence to support healthcare innovations within biomedical, biopsychosocial, and alternative models of healthcare [41,42]. End-users of healthcare includes patients, their families and their friends who support their care.

End-users' awareness of the healthcare diversity and uncertainty affects their perceptions of information provided to them directly by healthcare providers [43,44]. At the same time as the

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http://dx.doi.org/10.1016/j.techsoc.2017.05.001
0160-791X/

end-users' awareness of healthcare diversity and uncertainty is increasing, end-users are interacting with more AI (artificial intelligence). This includes software that can be used to make sophisticated clinical diagnoses; and robots with which patients can discuss their most sensitive personal healthcare topics. Thus, addressing healthcare diversity and uncertainty involves human to AI communication, as well as human to human communication [45,46]. However, there is currently a lack of framing structure around which healthcare end-users and healthcare providers can construct common ground about healthcare diversity and uncertainty. Without a unifying framing structure, there can be more conflict than coherence amidst the ever increasing volume of healthcare information [47].

In this paper, critical realism is proposed as a source for healthcare framing. The study involved analysis of philosophies of science in relation to healthcare; research for, and formulation of, explanatory examples; and definition of implications for human to human and human to AI communication. The remainder of the paper comprises six sections. First, the need is explained further for including causal interdependencies and uncertainties in healthcare framing. The need is explained from the perspectives of human to human communication and human to AI communication. Then, it is explained how critical realism [48,49] can provide a basis for framing causal interdependencies and uncertainties. Next, an example is provided of critical realist framing for causal interdependencies. Subsequently, an example is provided of critical realist framing for causal uncertainties. In the penultimate section, implications are discussed for human to human communication and human to AI communication. In conclusion, principal findings are summarized.

2. Need for framing of causal interdependencies and uncertainties

End-users' increasing awareness of diversity and uncertainty can affect their perceptions of healthcare providers' communication about healthcare. This is because access to information about diversity and uncertainty via other sources can lead to end-users forming schemata of preconceptions about healthcare. In particular, schemata of preconceptions establish end-users' "top-down" expectations as they receive "bottom-up" sensory information. Then, in order to yield a positive cognitive effect, such as answering a question, settling a doubt, correcting a mistaken impression, and/or improving knowledge, a healthcare provider's communication has to connect successfully with a patient's schemata of preconceptions [50–53].

Preconceptions have been defined as being ideas formed in advance before one can possibly know or form a reliable opinion [54]. Nonetheless, in many situations, preconceptions can determine the scope of people's thinking about what to do and how to do it [55,56]. Hitherto, end-users' schemata of preconceptions may have been focused on their own spheres of work [57,58]. However with use of the Internet, World Wide Web and Social Media, each end-user can establish her or his own individual schemata of preconceptions about healthcare diversity and uncertainty from, for example, free online medical courses; wiki pages about symptoms; chat forums about health conditions; etc. [59,60]. Moreover, preconceptions can be negative due to end-users being able to easily access headline grabbing reports, such as unnecessary blood transfusions are linked to higher death rates; that surgery on a Friday is much more dangerous than surgery on a Monday; that newer hip replacements can have serious side-effects; that general check-ups are counterproductive; and so on. Thus, use of the Internet, World Wide Web, and Social Media to access easily healthcare information is not likely to evolve communication between end-users and human healthcare providers towards shared positive coherence [61–63].

AI healthcare providers also have to connect successfully with end-users' schemata of preconceptions in order to yield positive cognitive effects such as answering a question, settling a doubt, correcting a mistaken impression, and/or improving knowledge. This may include end-users interacting with Web-based AI systems involving narrow topic-specific written dialogues through a variety of communication media [64,65]. Increasingly this may also include more general haptic and verbal interactions with robot healthcare providers [66,67]. Yielding positive cognitive effects among end-users through haptic and verbal AI interactions will be even more challenging than through written communications with AI via online topic-specific forms etc. This is because the oldest human capabilities, such as conversational perception of words and images, are more difficult to reverse engineer into AI than newer human capabilities, such as advanced mathematical reasoning [68,69].

The range and depth of an AI's communications can be determined at the outset by systems engineering. This includes specifying the concepts, relationships, and other distinctions that are significant in the AI's intended domain of operation [70,71]. Initial systems engineering of AI systems are inevitably influenced by the preconceptions of humans who carry out the systems engineering. Thereafter, different types of machine learning can enable AIs to further develop their operation from inputs. Rather than following only program instructions defined at the outset [72,73]. However, the phrase "Garbage In, Garbage Out" is very applicable to machine learning. If inputs into AI are flawed then the outputs from AI will be flawed. In particular, if AIs interact continually with humans who have discourses and behaviours based on a multitude of diverse flawed healthcare preconceptions: then patient/AI healthcare communication will not evolve toward positive coherence when considering causal interdependencies and uncertainties [74,75].

In contrast to innumerable haphazard human searches of online healthcare information, and AI exposure to discourses based on consequent flawed human preconceptions, critical realist framing can provide a starting point for evolution towards shared positive coherence between healthcare providers and healthcare end-users.

3. Critical realism as a basis for framing causal interdependencies and uncertainties

The ontological, epistemological, and methodological foundations of critical realism have been developed over four decades [49,50]. In common with the positivism of natural sciences, critical realism posits that reality is an objective structure that exists independently of social constructions. Also in common with positivism, critical realism holds that it is possible to construct knowledge that represents or mirrors reality as it objectively exists. Beyond this, positivism and critical realism differ. In particular, positivism is oriented to the testing, confirmation, and falsification of generalizable theories, which correspond directly with objective reality. By contrast, critical realism emphasizes that humans experience only a portion of the objective world, and the objective nature of the world is not easily apprehended, characterized or measured. Accordingly, critical realism holds that theories cannot be directly measured against the objective world. Rather, theories can only be compared with each other to see how well each explains the observable phenomena being studied.

In particular, critical realism encompasses a three-domain stratification of reality. These are the mechanisms that comprise objective reality (i.e. "why" things happen); the actual events brought about by the mechanisms (i.e. "how" things happen); and the experiences which people perceive as evidence of events (i.e.