Participatory Technologies: affordances for development

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Abstract. This work-in-progress paper presents a line of research analysing the affordances of a range of participatory technologies for development. Affordances are the 'actionable possibilities' that are made possible (but not determined) by a technology. Participatory technologies are a range of technology-mediated practices used in participatory development initiatives, such as participatory video and participatory digital mapping. This research examines the relationship between technological artefacts, participatory processes and development outcomes and asks to what extent one contributes to another. As this is work-in-progress it is too early to draw firm conclusions however this paper identifies the need to distinguish between a participatory technology's technical features, its functional affordances and the affordances of participatory video practices. Affordances seem to provide a potential conceptual means to bridge the relatively technocentric and realist approaches of some IS, HCI and ICT4D with the relatively anthrocentric and constructivist approaches of some STS and development studies.

1 Introduction

The rapid proliferation, new functionalities and falling costs of mobile phones, laptops and other information and communication technologies (ICTs) has facilitated their increasing incorporation within development initiatives and has prompted the study of the application of ICTs for development (ICTD) [1]. The accelerating adoption of digital tools by practitioners of 'participatory development' has given rise to a range of new tools and practices that Robert Chambers has called 'participatory technologies' [2]. In this research the term participatory technologies refers to the use of digital information and communication technologies in participatory development processes. The main aim is to better understand the relationship between technological artefacts, participatory processes and development outcomes.

That technology is increasingly important in development is generally accepted. However the precise ways in which technology inhibits or contributes to development outcomes remains the subject of much debate and research. In the existing literature on the use of information and communications technology for development (ICT4D) it has been argued that the technology itself is generally under-theorised [3], that the particular conceptualisation of development being used is rarely explicit [4][5], and that the specific relationship of ICT to development is often uncritically assumed [6]. This research addresses these issues by making theoretical contributions in relation to the technology itself, making explicit the conceptualisation of development being used, and by presenting a critical analysis of the relationship between the technology, participatory processes and development outcomes. It achieves this without falling into technological determinism by grounding its analysis a critical realist ontology [7] and by using the concept of affordances in a way that takes seriously the role of technology in shaping society without ever losing sight of the way that technology is itself social shaped [8].

1.1 Matter Matters

Since the 1980s much Science Technology and Society research was part of a project to correct what it considered to be a technological determinism in the existing literature [9]. This body of work sought to theorise technology as social shaped and located in mutually constituted socio-technical assemblages of human and non-human actants [10]. So successful was this push back that Orlikowski argued convincingly that technology was the 'missing mass' in much Information Systems (IS) research [3]. From Orlikowski's perspective a failure to take seriously technology's materiality necessarily limits a comprehensive

understanding of the relationship between information systems and social change. Following Orlikowski I argue that 'matter matters' in ICT4D research; that design and materiality have consequences for users. However any researcher that takes seriously technology's materiality is compelled to mount a defense against the accusation of technological determinism. Following MacKensie and Wajcman [8] I argue that it is perfectly consistent to recognize both that technology is shaped by society and that technology shapes society; that they are mutually constitutive. The ontological position of critical realism [7] is helpful in this regard as it recognizes that the physical world is Real at the same time as accepting that all human experience of the Real is necessarily partial, subjective and socially constructed. This ontological position effectively collapses the realism vs constructivism dichotomy. Critical realism allows us to recognize the Real without falling into technological determinism. This research is grounded in such an ontology.

1.2 Participatory Development

Participatory development practices derive their logic from a particular agency-based conceptualisation of human development [11; 12]. Orthodox development economics often reduces the evaluation of development success to econometric quantitative indicators such as GDP per person. Southern activists proposed a radically different 'bottom-up' normative approach in which disadvantaged people themselves determine the priorities of development [13]. This agency-based participatory approach to human development is the main heterodox approach to development. Distinctive features of this approach include its emphasis on the participation of disadvantaged people in epistemological processes that enable them to define, articulate and voice their own development concerns and priorities. This research is informed by this conceptualization of development in which disadvantaged people themselves are the authors, architects and arbiters of their own projects of development.

1.3 Affordances

This research is concerned to disentangle and better understand the complex interrelationship between the social and technical elements of participatory technology use in human development. The concept of affordances has some distinct advantages in this regard.

Affordances are the 'actionable possibilities' invited, enabled or allowed by a technology [14]. A cup for example has the actionable possibility of conveying tea for drinking. The material properties of a cup, its handle, its waterproof material and handy size matter; they invite and enable the action tea holding and conveyance. It is important to note that whilst affordances both enable and constrain the range of action possibilities they never determine; agency and choice remain. A person could use their agency to appropriate the cup for the action of pen and pencil storage. Costall [15] would distinguish tea holdabilty as the 'canonical affordance' of a cup i.e. the conventional and normative actionable possibility which socialisation has normalised for cups. The concept of affordances has not previously been systematically applied to participatory video. Participatory video is a social process in which non-experts co-produce and film about an issue that concerns them [16]. The existing literature often notes that participatory video is efficacious in stimulating increasing participant, agency and voice [17] all of which are considered valued human development outcomes [12].

The next section will review the existing literature and establish the theoretical framework adopted in this research. Although affordance theories are relatively well developed in the fields of Human Computer Interface (HCI), Information Systems (IS) and informatics, the application of affordance theory is relatively scarce in the development studies literature. Conversely, participation theories are well established in development studies literature but are relatively under-represented in the ICT4D literature. This research anticipates that a better understanding of the affordances of participatory technologies for development will act as one bridge between these research communities.

Section 3. considers the research methodology adopted in this research. By conducting desk research, interviewing leading practitioners, convening a one day conference, and by commissioning new research on existing and emerging participatory technologies this research will produce new knowledge and analysis and make new theoretical contributions on the specific affordances of technologies and practices of participatory development.

Although this is work in progress paper Section 4. presents some preliminary and tentative findings, using participatory video as an explanatory example. The affordances of the video technology itself gives rise to functional affordances but the research finds that it is only when these affordances are mediated through the social mechanisms of participatory practices that development outcomes are evidenced. The research also suggests that the nature of the development outcomes are contingent on other contextual factors not least the capacity and intent of the process facilitator(s).

2 Existing Literature

2.1 Development

Dominant models of development emphasise 'economic development' evaluated by means of proxy measures such as GDP income per head. Challenging this approach as reductionist heterodox models emphasise 'human development' [12]. Advocates of human development often argue that a person has reason to value things that cannot be reduced to economic indicators such as political freedom, well-being and personal agency. From this perspective a person's agency as a protagonist in their own development projects and their ability to 'voice' their own preferences and priorities is axiomatic elements of the kind of development that people have reason to value [12]. Post-colonial independence leaders such as President Nyerere of Tanzania argued that, "people can't be developed, they can only develop themselves" [18]. For this reason adherents of participatory development often argue normatively that individuals have reason to value participation in the design, implementation and evaluation of any development initiatives that affect them. This heterodox 'bottom-up' process of enabling people to determine and to attain their own self-defined objectives [13] was at the heart of Freire's [11] work in Brazil, as well as that of Orlando Fals-Borda in Colombia [19], Rajesh Tandon in India [20] and Swantz in East Africa [21]. Freire provided practical guidance on the group process of conscientisation by which disadvantaged people can better understand their circumstances, identify the root causes of the problems that they experience and act together to transform the situation [22]. Such participatory development processes constituted what Tandon [23] claimed represented a distinctly Southern approach to development practice and research. Participatory development approaches and methods were popularised in Anglophone development studies and practice by, among others, Robert Chambers [24] and form part of the conceptual framework for most of the canonical texts on participatory video [16; 17]. These ideas were later extended by the Nobel-prize winning economist and philosopher Amartya Sen as part of his agency-based conception of human development. Sen [12] wrote,

> "*With adequate social opportunities, individuals can effectively shape their own destiny and help each other. They need not be seen primarily as the passive recipients of cunning development programs. There is indeed a strong rationale for recognizing the positive role of free and sustained agency"*

This agency-based model of participatory development in which disadvantaged people are the authors, architects and arbiters of their own development priorities and projects, is the conceptualisation of development adopted in this research. This raises the question of what counts as participation in this research?

2.2 Participation

In the 1990s participatory development approaches were widely adopted by mainstream development institutions and funders like UNDP and the World Bank. Some scholars argued that this resulted in a dilution and corruption of the original radical intent of participation. Critiques of tokenistic and sham forms of participation were a feature of the contributions to the edited volume *The Tyranny of Participation* [25]. Whilst not seeking to negate this valuable critique, in *From Tyranny to Transformation*, Hickey and Mohan

[26] attempted to recover and re-politicise participation and to clarify the ways and circumstances in which participation could again be emancipatory and transformational. It was argued persuasively that this could be accomplished by strategies such as embedding participation within wider political processes [27], and by returning to a focus on building critical consciousness and agency into participatory development through Freirian practices such as conscientisation where participants critique the social conditions that oppress them and use their collective agency to challenge the situation [28]. This research draws on these later approaches whilst recognising that participatory technologies have potential both to reproduce existing unequal social relationships as well as to transform them. This research therefore seeks to unravel the particular circumstances in which digital technologies and participatory practices can be emancipatory and transformative.

Participation is not a binary concept. Various scholars have argued for different scales of participation along a range from relatively weak to relatively strong forms of participation. Arnstein's [29] ladder of participation is the archetype and ranges from 'non-participation' through degrees of tokenistic participation up to degrees of real power through which citizens can take effective control of the participatory development process. White [30] uses a variant range extending from nominal participation to transformative participation.

For this research I have developed a range of 'Elements of Participation' to reflect the constituent elements of the agency-based conception of participatory development adopted in this research. At the 'weak' end of the range of participation is 'taking part in an activity' which most participatory technologies can be expected to involve. At the 'strong' end of the scale is 'achieving power reversals' which few participatory technologies may be expected to achieve. It is not proposed that technologies are considered to be participatory technologies only if all elements are maximally present; maximal presence is not necessarily expected in any case. It is only proposed that the elements provide a relevant reference point for tracing the relationship of a technology's affordances to the elements of participatory development.

Elements of Participation	**Scale**
Achieving power reversals	Relatively Strong
Acting together for transformation	
Naming injustice and root causes	
Planning action for transformation	
Identification of power interests	
Group analysis of causes of inequality	
Voicing of experience & opinion	
Reflection about social circumstances and self	
Taking part in an activity	Relatively Weak

Table 1.
Elements of Participation

2.3 Participatory Technologies

In this research the term participatory technologies refers to the use of digital ICTs in participatory development practices. However the use of participatory methodologies in development practices pre-date the introduction of digital technologies by several decades. Participatory video practice dates back to at least 1967 [31], participatory mapping to the 1980s and participatory monitoring and evaluation to the 1990s [32]. The existing literature on (pre-digital) participatory methodologies is a rich source of learning for practitioners and researchers of participatory ICT4D. It is important that ICT4D research and practice is mindful of the continuities between participatory methodologies and participatory technologies as well as the discontinuities.

Participatory video has a long history as an analogue participatory technology using celluloid film before it was later digitised and, even more recently, became possible entirely on mobile phones [33]. Participatory mapping was previously practiced by drawing on the earth, and later on paper (and these continue to be appropriate practices in many settings) but now also makes use of mobile phones, GPS, satellites, GIS software and unmanned aerial vehicles or 'drones' [34]. Previously analogue participatory methodologies that are now migrating to digital technologies are 'digital immigrants' whereas some are 'digital natives' [35] meaning that they were originated as digital methods without clear analogue precedents. Examples of this later group include online platforms for citizen participation in satellite-based environmental monitoring and 'crisis mapping' or the real time crowdsourcing of humanitarian data from the public using mobile phones and social media.

The types of participatory technologies considered by this research include participatory video, participatory photography, participatory digital storytelling, participatory digital community radio, participatory digital mapping, participatory digital monitoring and evaluation, participatory civic engagement technologies, participatory budgeting, participatory software development, and participatory political mobilisation. Whilst 'The Arab Spring' is often offered as an example of social media's role in stimulating political participation, the 2009 Obama, and 2016 Trump campaigns can also be considered to be examples of participatory online building of communities of political agency for radical social change. If it is argued that some technologies have advantages when it comes to stimulating participation then the questions arises as to what exactly are the technical features or participatory practices that contribute toward (or inhibit) human development. The next section explores the concept of affordances as a means to do so.

2.4 Affordances

The concept of affordances can be traced to its use by the visual psychologist James Gibson [36] to refer to the actionable possibilities suggested when viewing an object. Donald Norman [37] later applied the term to technology design using it to signify the particular aspects of a technology that *invite, allow or enable* a user to act in a particular way [38]. The design of a cup can be understood as inviting or enabling us to make use of its actionable properties as a drinking vessel. A fork does not invite the same use; we perceive the two technologies as having different actionable properties. Affordances are not however determinate; we can choose to interpret a cup as a pen holder. Hutchby's defines affordances as having both *"functional and relational aspects which frame, while not determining, the possibilities for agentic action in relation to an object"* [39]. Hutchby's definition requires us to pay attention to both the *functional* aspect of affordances that are based in the object's material form as well as the conventional boundaries of acceptable use that we learn as part of socialisation, which are situated. Zheng and Yu [40] use the example of chopsticks as artefacts whose affordances can be expected to be self-evident to most Chinese adults. However members of another society who have not learned that 'canonical' affordance may (mis)interpret chopsticks as a plaything; they would not however interpret them as a drinking vessel. The point here is that artifacts are always open to interpretive flexibility [9] but that their materiality places limits on that interpretation. There is always a thing being interpreted, and its 'matter matters'. Hutchby argues convincingly that "Ignoring the different affordances which constrain both the possible meanings and the possible uses of technologies denies us the opportunity of empirically analysing precisely what the 'effects' and 'constraints' associated with technological forms are" [39]. My intention in employing the concept of affordances is to allow such an empirical investigation. Faynard and Weeks [41] use the concept of affordances to integrate these appreciations of both the real materially-situated properties of an object and

the scope for interpretative flexibility in relational use. This critical realist understanding of affordances is the one that informs this research.

In the context of agency-based conceptions of human development adopted in this research it is useful to understand a technology's affordances as those properties that invite or enable aspects of a user's agency; the way a person uses the technology to act in the world. The affordances of a technology can be either positive or negative in relation to a person's agency; features of a technology can either constrain or enable action on the part of a user. The viewability of text messages may be advantageous to a deaf person but disadvantageous to person who is print disabled. With respect to participatory video the multi-mediality of video mediated processes can enable print-disabled people to participate in social discourse, to voice their perspective and to retain editorial control over the way that they are represented. This is an example of the use of technology in participatory practices to produce development outcomes that individuals have reason to value. The next section outlines the methodology used in this research.

This research anticipated being able to trace the affordances of a particular technology (in the left-hand column in Table 1.), via the particular Elements of Participation that they afforded (in the central column), to named development outcomes (in the right-hand column). Two examples are illustrated in the table. In the first example it could be argued that as video technology affords users the ability to project their self-authored films to audiences it contributes to amplifying their voice. In the second example, as has already been mentioned, the rewind and re-edit affordances of video afford participants the opportunity to reflect on their experiences and to co-produce new knowledge and learning.

3 Methodology

This research uses a mixture of qualitative methods including semi-structured interviews and three research phases. The first phase was desk research to review the existing literature on participation, participatory development, participatory technologies and affordances. Phase one also includes 16 semi-structured interviews with global scholars of participation, participatory technologies and affordances. Phase two involves the convening of a one day workshop of participatory technology specialists to inform the key research questions. New research will be commissioned for a special issue on the affordances of participatory technologies for development.

In phases one and two contributors will be asked to answer 'the technology question' i.e. what are the functional affordances of the technology that inhibit, invite, allow or enable participatory practices? They will also be asked the 'participation question' i.e. what 'Elements of Participation' are evident in their participatory processes and to which practice affordances are they attributable?

The third research phase will involve analysis of the above data to disentangle the social and material inter-connections. By interrogating each participatory practice it is intended to shed new light on the nature of the relationships between technologies, affordances and participatory development. By doing so the research will provide new empirical and theoretical resources for the application of digital technologies in development. Although this paper uses the example of participatory video the research will analyse the affordances of a broad range of participatory technologies to derive theoretically generalizable findings. Given the rapid proliferation and combination of participatory technologies any such lessons will be potentially valuable.

4 Findings & Discussion

Preliminary findings of this work-in-progress suggest that it is possible to map technology and affordances to development outcomes. The relationships however are more complicated than originally anticipated in a number of respects. Whilst the re-edit and project functions of the video camera do give rise to particular affordances they do not contribute directly to development outcomes; they appear to do so only through multiple social mechanisms. On one level the reasons for this are evident; other social forces are entangled. As Gibson himself emphasized, affordances do not determine; they do not make us do things in and of themselves [36]. Affordances are only action *possibilities* not sufficient causes. For this reason we can expect different people to use the same video camera in different ways and with different outcomes. Development outcomes cannot be read off technology in a deterministic way. The research has begun to

shed light on the complex ways in which technologies' affordances are mediated not only by the social mechanisms of participatory video but also by the capacity and intent of the process facilitator and participants [42].

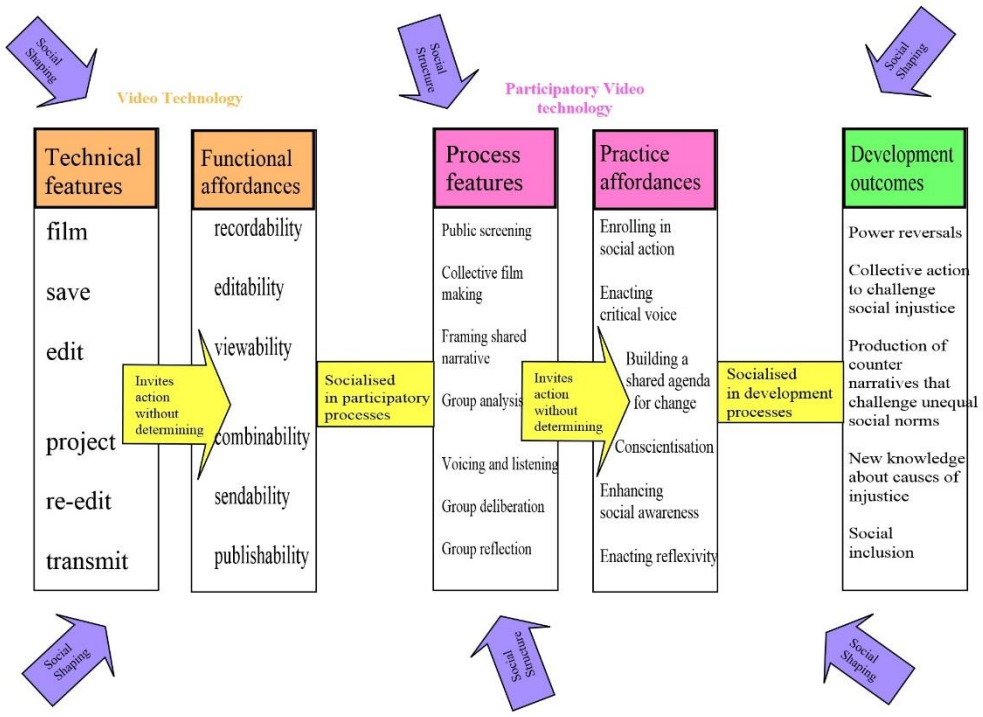

Fig. 1. Affordances of Participatory Video for Development (adapted from Zheng and Yu).

4.1 Functional Affordances vs Practice Affordances

One way to begin to capture these differences is to make a conceptual distinction between the functional affordances arising from technological artifact itself (in this case the video camera) and the practice affordances arising from the social processes being employed (the participatory video practices). Figure 1. illustrates this division set within the wider context of this research. It should be emphasized that this is work-in-progress and this diagram is not presented as indicative of final research findings but rather as a schematic representation of research thus far using the example of participatory video [43]. Importantly the diagram illustrates that technologies are themselves socially shaped [8]. These processes do take place not in a social vacuum but rather in a social context that dynamically co-constructs the technological artefacts, affordances and development outcomes (as indicated by the six arrows).

The left hand column in Figure 1. shows some of the technical features of a video camcorder. This is not intended to be a comprehensive list but rather illustrative examples. These technical features matter. Technical functions of the video camera such as edit and project give rise to the perception of actionable possibilities such as viewability and editability in the second column of the diagram. These functional affordances enable (and limit) the range of action possible with the technology (without determining or removing the scope for agency). Functional affordances do not themselves constitute development outcomes. They can however be drawn upon in participatory video processes in ways that may subsequently contribute to development outcomes.

Figure 1. shows that the functional affordances of video are socialized in the collective processes of participatory video film-making. Participatory video process typically involve a group of socially disadvantaged people in the collective process of making a film about issues of concern to them. The film

maybe intended as advocacy to raise awareness on a neglected issue or to be viewed by distant decision makers to change policy on a subject of concern.

The third column illustrate some process features of participatory video. These are also significant as they give rise to the perception of the actionable possibilities for participatory video illustrated in column four. Participatory processes such as group deliberation and reflection enable actionable possibilities of participatory video such as enacting social awareness and formation of shared intent for social action. This is not a claim that participatory video causes or determines such outcomes. The only claim being made is that participatory video practices allow these action possibilities without determining them.

The affordances of participatory video practices are necessary but insufficient to determine wider development outcomes. The making of a single film may be meaningful to the individuals involved; it may increase their sense of self-efficacy and social awareness but in and of themselves they are unlikely to generate wider social change. To co-constitute social change participatory video practices will generally need to be embedded in wider social change processes [27; 28].

In summary Figure 1. illustrates how the technical features of video make possible (without determining) its functional affordances, which are then socialised in the collective processes of participatory video. This relationship is then mirrored in the way that the process features of participatory video make possible (without determining) its practice affordances, which may then be socialised in wider development processes to co-generate development outcomes.

5 Conclusion

Based on this initial research it is argued that the concept of affordances offers a viable means to better understand the complex relationship between technologies, affordances, social mechanism and development outcomes. By continuing to pursue this research-in-progress across a range of established and newly emerging participatory technologies this research intends to shed new light on the relationships between technologies, affordances, social mechanisms and development outcomes. As Hutchby [39; 442] argues academics must examine the ways in which "social processes and the 'properties' of technological affordances are inter-related and inter-twined and need to analyse the ways in which they are".

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