

Dual-Theory Analysis of Organized Participation in Experimental Research

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HCDE 501

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Mar 12, 2025

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1. Introduction

Pay, and you can get participants? It may seem tricky to some people outside of the range. But it happened the last time I did a HCI study focusing on Accessibility issue and tried to recruit participants. I've encountered crowdsourcing platforms like Credamo and Wenjuanxing(similar to AMazon Turk) that can organize participants most quickly for studies as long as you pay. Yet, after recruiting 100+ workers for a recent study, I've grown skeptical. The organized, purpose-driven nature of these platforms—where participants chase quick payouts under rigid rules—might superimpose biases into my data, skewing results and raising ethical concerns.

This paper will look into that unease by combining Distributed Cognition (DCog) and Activity Theory (AT) to dissect a specific work event: recruiting 100+ participants for an Accessibility study. My goal is to reveal how these platforms subtly distort research outcomes in ways unnoticed by participants or casual observers. First, I will explore key concepts from Distributed Cognition and AT, designed to obtain insights that help demonstrate. Then, I will justify pairing these theories, apply them to my experience, and draw insights that connect to HCI broadly. Kaptelinin frames this challenge: “It appears that cognitive psychology can be successfully applied to several HCI problems. However, this approach has some limitations. An important one is that the ‘ecological validity’ of cognitive psychology is questionable (Kaptelinin, 1996, p. 54). Thus, I plan to use Distributed Cognition and Activity Theory to probe beyond laboratory-bound assumptions into the messy reality of crowdsourcing.

2. Theoretical Perspectives

2.1 Distributed Cognition (DCog)

Distributed Cognition totally changed how I see cognition—it's not just locked in our heads; it's spread out into the systems and tools around us. Hollan et al. (2000) put it like this: “Cognitive artifacts transform the tasks they support” (Hollan et al., 2000, p. 176), adding that “processes may be distributed through time in such a way that the products of earlier events can transform the nature of later events” (p. 176). At first, that sounds simple, but it's kind of true—and kind of freaky. Tools meant to help us don't just assist; they take over how we see and express things. It gives this cool example: “Just as a blind person's cane or a cell biologist's microscope is a central part of the way they perceive the world, so well-designed work materials become integrated into the way people think, see, and control activities, part

of the distributed system of cognitive control” (Hollan et al., 2000, p. 176). It’s like our minds, which build models of the world, get hijacked by these “external resources.” The stuff we’re supposed to figure out ends up running the show, “embodying constraints that alter cognitive processes and leave a mark on the cognition model we build”(Hollan et al., 2000, p. 177).

I started picturing it this way: imagine my study’s goal as the starting point on a map, and the methods, like MTurk and Credamo, are the “blind person’s cane” reaching out to participants. Hollan says, “The theory holds that cognitive activity is constructed from both internal and external resources, and that the meanings of actions are grounded in the context of activity” (Hollan et al., 2000, p. 179). So, my results aren’t just mine—they’re scattered across the system of tools and feedback I’m using. How accurate they are depends on that “external world” I can touch with my “cane.” But here’s where Distributed Cognition trips me up: it’s all about the system—“tools impose their own logic” (Hollan et al., 2000, p. 180)—and not so much about why people grab the cane. They note, “People off-load cognitive effort to the environment whenever practical”, but it skips over what drives them. Furniss points out a snag: “It may not readily emphasise the role of individuals or emotions as it focuses on systems and more observable functional issues” (Furniss et al., 2019, p. 84).

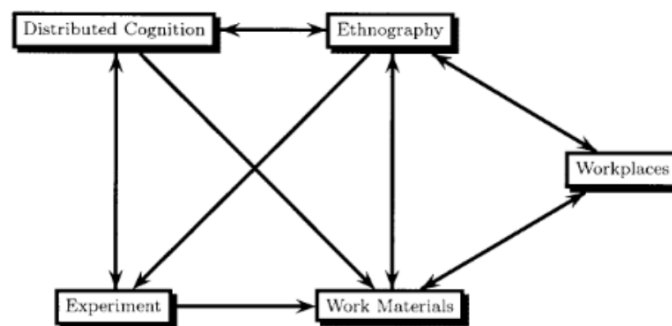


Figure 1

Integrated research activity map, showing how cognition spreads across tools and participants.

That’s where it gets tricky—and honestly, pretty interesting. “Cognitive processes may be distributed across the members of a social group or embodied in artifacts” (Hollan et al., 2000, p. 175), but treating people like outsiders to the system feels off-balance. Take their example: “Analysis of how airspeed instruments are used shows that the way pilots use airspeed instruments is more complex and more interesting than might have been suspected” (Hollan et al., 2000, p. 180). Tools can mess with what we mean to do—so who’s deciding that logic? Coordination matters indeed: “Coordination is central to

distributed systems” (Furniss et al., 2019, p. 42), but what if it puts everyone into the same static, biased structure? And “artifacts are shaped by prior practice” (Hollan et al., 2000, p. 177)—so old design choices stick around, but whose choices? To me, Distributed Cognition’s big deal isn’t just spreading cognition—it’s handing it over to this “ecology” (Hollan et al., 2000, p. 175) we don’t fully control. That’s a wake-up call: we’re building tools that might think for us, and I’m not sure we’ve got a grip on that yet.

2.2 Activity Theory(AT)

AT looks at things in a way that’s totally different from Distributed Cognition—it’s all about what people do with tools and why, and honestly, it’s messy in a way I kinda love. Kaptelinin and Nardi start it off: “Tools mediate subject-object relations” (Kaptelinin & Nardi, 2012, p. 25). Sounds pretty straightforward, right? But then they hit you with, “Mediating artifacts are shaped by cultural practices” (Kaptelinin & Nardi, 2012, p. 27)—so these tools aren’t just sitting there; they’ve got baggage, like “historical residues”(Engeström, 2000, p. 960), stuff from the past that sticks around. They’re not neutral helpers; they “constrain simultaneously” (Kaptelinin & Nardi, 2012, p. 27) and “reflect community values” (Kaptelinin & Nardi, 2012, p. 29). That means they’re nudging us toward what the folks behind them care about—not always what I’m after. Engeström gets to the juicy stuff: “Contradictions drive systemic development” (Engeström, 2000, p. 965). When “motives destabilize activity” (Kaptelinin & Nardi, 2012, p. 34), things don’t just shift—they twist, and “unresolved contradictions distort outcomes” (Engeström, 2000, p. 966). Fixing it might take “extraordinary measures”, but most of the time, we’re just stuck in the chaos.

Here’s the fun part: “Activity systems are dynamic” (Kaptelinin & Nardi, 2012, p. 31). That’s their way of saying things move and change all the time. But what happens when everyone’s not on the same page? If “motives undermine activity” (Kaptelinin & Nardi, 2012, p. 34), it’s like the whole system freezes—or worse, pulls apart. I started putting myself in my own shoes with that crowdsourcing study. The platforms want revenue, workers want quick cash, and I want good data—those don’t line up at all. Engeström (2000) calls it out: “Activity systems are multi-voiced” (p. 964)—everyone’s got their own say, and that’s where it gets messy. Hidden mismatches show up in how people might act: Workers might skim questions for faster payoffs, platforms push for a bigger user base to rake in more fees, and I’m over here hoping for detailed, thoughtful feedback from attentive participants. “Artifacts shape how goals are pursued” (Kaptelinin & Nardi, 2012, p. 26), so each of us is pushing the activity in a different direction.

That's the red flag for me—what if my research goals and the tool's crowd are working in opposite ways? AT isn't just about tools making life easier; it's about the tension in that “motive-tool interplay” (Engeström, 2000, p. 961). Compared to DCog's neat little setup, AT's like a messy room where “the history embedded in artifacts shapes their use” (Kaptelinin & Nardi, 2012, p. 28). Workers rushing through tasks? That's years of gig economy habits baked into the platform. Platforms chasing profit? That's their business model talking. And me wanting careful responses? That's my research hat on—but who's actually in charge here? “Tools evolve through collective activity” (Engeström, 2000, p. 962), but if we're all pulling different strings, it's more tangle than teamwork. I think HCI skips over this messiness too often, and it's starting to bug me big time.

2.3 Justification

I'm pairing Distributed Cognition (DCog) and Activity Theory (AT) because they fix each other's weak spots. DCog is awesome at showing how tools take over—I mean, like Hollan et al.,(2000) say, “Cognitive processes are distributed across actors and artifacts” (p. 175). It's like the system's calling the shots. But here's where it trips me up: it's super quiet on why people do what they do. Furniss et al. (2019) point out it “neglect[s] individual motives” (p. 47), and Hollan et al. (2000) admit “agency is secondary” (p. 181). It's all about the setup, no heart behind it. That's where AT jumps in—it's got soul. Engeström (2000) says, “Motives shape outcomes” (p. 961), and “contradictions uncover flaws” (p. 967). It ties tools to “social context” (Kaptelinin & Nardi, 2012, p. 26), giving me the why behind the what DCog lays out.

Mixing them just feels right for my work—it's like they click together. DCog's “tools impose their own logic” (Hollan et al., 2000, p. 180) gets way more interesting when AT tosses in “historical residues” (Engeström, 2000, p. 960)—suddenly, I can ask whose logic I'm stuck with. Like, is it MTurk's gig-economy vibe or my research vibe? AT's “unresolved contradictions distort outcomes” (Engeström, 2000, p. 966) lines up with DCog's “breakdowns reveal systemic limits” (Furniss et al., 2019, p. 45)—that combo turns fuzzy tension into something I can actually grab onto, like why my data's skewing. Baumer and Tomlinson (2011) nail it: “DCog and AT link structure and agency” (p. 5). It's that blend Rogers (2012) talks about: “blend technical and social” (p. 17). For my crowdsourcing mess, DCog shows how the platform's got this tight grip—timers, templates, all that jazz—while AT digs into why it's slipping out of my hands, with workers chasing cash instead of my goals. Alone, DCog's too cold, and AT's too vague—together, they're my best shot at sorting out this bias headache.

3. Experience Analysis

3.1 Event

In an accessibility study trying to explore technology acceptance in older adults, it was necessary to collect data from 100+ test users through a pre-set questionnaire. Due to the difficulty of reaching older users directly, we were pleasantly surprised to see that platforms like Credamo, Mturk could help organize participants. This channel allowed us to set factors such as target users and directly prepared us to experiment with users who rated features and provided feedback. Posting, completing, and paying were all very quick. However, guided by timers and templates, subsequent research and analysis made us wonder if the respondents to the questions were really older people? Considering the difficulty of reaching older users and the lack of an empirical user base, this setup started to feel off. I couldn't help but wonder if this could be overlaying bias, making my data more reflective of wage earners looking for a quick buck than real users? And to what extent does this response pattern reflect real demand?

3.2 Analysis

Distributed Cognition (DCog) makes me think platforms like MTurk and Credamo are kind of bossy in a sneaky way. Hollan et al. (2000) say, "Artifacts transform tasks" (p. 176)—those timers and low pay don't just speed things up; they turn my study into a race. I wanted thoughtful feedback from older adults, but "the nature of artifacts determines how tasks can be performed" (Hollan et al., 2000, p. 179)—so my data might look more like the platforms' idea of quick work than actual user thoughts. "Tools impose their own logic" (Hollan et al., 2000, p. 180), and here it's all about efficiency, not depth. It's like the gig-economy habits—"artifacts are shaped by prior practice" (Hollan et al., 2000, p. 177)—are baked in, pushing everyone to rush. "Coordination is central" (Furniss et al., 2019, p. 42), but it's so tight it flattens everything into sameness. I'm left wondering: are these responses even from older adults, or just folks who know how to game the system fast?

Activity Theory (AT) shows me why this mess happens—it's all about mismatched goals. Kaptelinin and Nardi (2012) note, "Tools mediate goals" (p. 25), but MTurk and Credamo are built for workers chasing quick bucks—"artifacts reflect community values" (Kaptelinin & Nardi, 2012, p. 29)—not my need for real insights from older users. That's a contradiction right there: "motives destabilize activity" (Kaptelinin & Nardi, 2012, p. 34). Workers might skim questions or fake their age to grab the cash, while I'm hoping for careful answers—those don't mix. "Unresolved contradictions distort outcomes"

(Engeström, 2000, p. 966), and I didn't have "extraordinary measures" (Engeström, 2000, p. 968) to fix it, like verifying every participant's age myself. "Tools evolve with use" (Engeström, 2000, p. 962), sure, but these platforms evolved for gig workers, not my study—"historical residues" (Engeström, 2000, p. 960) of that hustle culture are steering it away from me. "Activity systems are dynamic" (Kaptelinin & Nardi, 2012, p. 31), but they're pulling in directions I didn't want.

Putting DCog and AT together, it's pretty clear: the platforms' design and the workers' motives team up—"DCog and AT link structure and agency" (Baumer & Tomlinson, 2011, p. 5)—to throw off my study's validity. DCog's "breakdowns reveal limits" (Furniss et al., 2019, p. 45) pairs with AT's "contradictions drive development" (Engeström, 2000, p. 965) to show how timers and templates (structure) plus cash-chasing (agency) skew things. I wanted to know if older adults accept tech, but the data might just reflect gig workers pretending to be my target group—or not even bothering to pretend. "Cognitive processes may be embodied in artifacts" (Hollan et al., 2000, p. 175), and here, those artifacts are wired for speed, not authenticity. It's not just a little bias—it's a big red flag for HCI. Fast, uniform answers don't tell me what older adults really think, and that's a problem when I'm trying to design for them.

4. Exploration

This mix of DCog and AT showed me something sneaky: crowdsourcing's gimmicky speed hides bias. Furniss et al. (2019) say, "Systems obscure their own flaws" (p. 46)—workers don't notice timers rushing them, and I almost missed how "artifacts skew data" (Hollan et al., 2000, p. 179). For HCI, that's a heads-up: "cultural biases in tools limit diversity" (Kaptelinin & Nardi, 2012, p. 28). My data might reflect gig workers faking it fast, not older adults' real thoughts. The Consilience Project nails it—"technology reflects values" (2021, p. 3)—and my analysis proves it: MTurk and Credamo push cheap and quick over the integrity I need. "Tools impose their own logic" (Hollan et al., 2000, p. 180), and "unresolved contradictions distort outcomes" (Engeström, 2000, p. 966)—their hustle vibe clashed with my goals, warping what I got. We've got to rethink this, or our data's just fast, not right.

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