



# ASSOCIATION FOR CONSUMER RESEARCH

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## **The Accessibility Liability: Digital Information Undermines Conceptual Understanding**

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In this research, we explore how increasing reliance on digital information in the “Internet Age” affects consumer knowledge. We find that digital information (relative to “live” or print-based information) is associated with impaired information processing (understanding of information), even when information storage (memory for information) is unaffected.

### **[to cite]:**

Adrian Ward and Shane R. Schwikert (2016) , "The Accessibility Liability: Digital Information Undermines Conceptual Understanding", in NA - Advances in Consumer Research Volume 44, eds. Page Moreau and Stefano Puntoni, Duluth, MN : Association for Consumer Research, Pages: 21-25.

### **[url]:**

<http://www.acrwebsite.org/volumes/1022058/volumes/v44/NA-44>

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# Plugged In: How Consumers Choose and Use Technology

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## **Paper #1: Better to Have a Book in the Hand Than Two in the Cloud: Consumer Preferences for Physical Over Digital Goods**

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## **Paper #2: You are What You Track: The Effect of Failing to Log an Experience on Future Use of Tracking Apps**

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## **Paper #3: “Coming Alive” Through Headphones: Listening to Messages via Headphones vs. Speakers Increases Immersion, Presence, and Liking**

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## **Paper #4: The Accessibility Liability: Digital Information Undermines Conceptual Understanding**

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### SESSION OVERVIEW

The context in which we make decisions has a huge impact on our decision-making process. For example, consumers sometimes make choices based on extraneous factors, including anchors (e.g., Ariely, Loewenstein, and Prelec, 2003), framing (e.g., Tversky and Kahneman, 1981), or how alternatives are grouped within a choice set (e.g., Huber, Payne, and Puto, 1982; Simonson, 1989). For decades, technological advancements have been constantly reshaping the context in which we make our decisions. Given that technological innovations are an inescapable aspect of our lives, it is important to further understand how they impact consumer behavior. What are the factors that affect how people select and interact with these technological advancements, as well as the possible consequences of these decisions?

Some research has started to examine how the use of technology impacts memory (e.g., Sparrow, Liu, and Wegner, 2011), social interactions (e.g., Ellison, Steinfield, and Lampe, 2007; Kraut et al., 1998), and self-perception (e.g., Wilcox and Stephen, 2013; Chou and Edge, 2012). The four papers in this session build on this work and illustrate how new technological contexts can influence consumer preferences, behavior monitoring, perceptions of others, and information processing.

Electronic and digital options are now the norm within our choice sets; for instance, within 15 years of introduction, sales of high-tech options like digital cameras and smartphones have outpaced their traditional counterparts (Zhang, 2014; Lomas, 2014). The first two papers examine how people interact with technological products. **Atasoy and Morewedge** investigate why consumers often prefer physical products over digital alternatives. They show that for a variety of goods, physical versions are more appealing because they invoke psychological ownership. **Silverman and Barasch** examine how and why people use smartphone apps to track their behaviors. They find that missing the opportunity to log an activity—even when this “miss” is outside the person’s control—decreases the user’s likelihood of logging the next relevant activity in a tracking app.

Additionally, people often make decisions within technological environments. The final two papers focus on the consequences of consumers’ interactions with technology. **Lieberman, Amir, and Schroeder** show that attitudes and perceptions of a communicator and message depend on the method of listening. Specifically, people

who listen to messages through headphones, as opposed to speakers, are more immersed in the message and view the communicator more positively, which in turn increases donations in economic games. **Ward and Schwikert** investigate how the ability to easily access information at a later date through technology impacts consumers’ processing of information. They find that people remember fewer conceptual details when information is presented in a digital, prerecorded format, compared to a live, unrecorded format.

Together, this session highlights the diverse ways in which technology impacts our daily lives. Given the widespread applicability of the issues discussed, we expect this session to attract researchers interested in experiential purchases, information processing, sequential decision making, memory, product engagement, and consumer identity. Much like “Wanderlust” invokes a sense of exploration, we hope that these varied approaches to technology invoke a lively discussion.

## **Better to Have a Book in the Hand Than Two in the Cloud: Consumer Preferences for Physical Over Digital Goods**

### EXTENDED ABSTRACT

New technologies have given rise to digital versions of many goods, including photographs, books, music, and movies, which has eliminated the need to use a physical medium to store this content (Belk, 2013; McCourt, 2005; Odom, Zimmerman, and Forlizzi, 2011; Petrelli and Whittaker, 2010). We examined whether people ascribe greater value to physical or digital goods in self-report and incentive compatible designs. We report five experiments that elucidate the preference between these two formats, and identify greater establishment of psychological ownership for physical goods as the mechanism responsible for their differences in valuation.

We predicted that physical versions of goods would be valued more than digital versions. Our prediction was based on previous research findings that established (1) a connection between physically interacting with objects and perceived ownership for the objects, and (2) a connection between perceived ownership and valuation. Touching (Peck and Shu, 2009) or imagining touching (Peck, Barger, and Webb, 2013) an object, as well as physically interacting with an object for a longer time (Wolf, Arkes, and Muhanna, 2008), increases perceived ownership. As the (perceived) opportunities for physically interacting with physical goods are better than similar opportunities for digital goods, we predicted a stronger perceived ownership for physical goods and consequently a higher valuation, as a long line of research has demonstrated that perceived ownership increases valuation (Kahneman, Knetsch, and Thaler 1990; Thaler 1980; Morewedge et al. 2009; Maddux et al. 2010; Dommer and Swaminathan 2013). Some qualitative evidence also suggests that digital goods may be valued less, as well as less strongly connected to their owners’ sense of selves (McCourt, 2005; Giles, Pietrzykowski, and Clark, 2007; Petrelli and Whittaker, 2010; Siddiqui and Turley, 2006), although others disagree with this proposition (Lehdonvirta, 2012).

We found in five experiments that participants ascribed a higher value to physical than digital versions of the same photograph, book, and movie, whether measured in an incentive compatible pay-what-you-want paradigm, willingness to pay, or purchase intention.

**Experiment 1** tested our hypothesis in an incentive-compatible field experiment using a pay-what-you-want design (Gneezy, Gneezy, Reiner, and Nelson, 2012). Tourists in Boston were given

as a souvenir either a printed photograph or a digital photograph (of higher quality) of themselves with a costumed historical figure at a historical site. They were then asked to make a donation for the souvenir photo to the organization that preserves the site, by paying whatever they wanted for the picture, including \$0. To control for potentially different beliefs regarding the production costs of physical and digital photographs, after collecting donations, participants estimated the average cost of producing their photographs. Participants paid more for printed photograph than digital photographs, even when controlling for the perceived cost of production ( $F(1,82) = 5.89, p = .02$ ). Note that the photos had no resale value, and thus the effect cannot be explained by a difference in market value.

**Experiment 2** found that this difference in valuation generalizes to other product categories including books, music, movies, and magazine subscriptions. Participants indicated a higher likelihood to purchase ( $F(1, 198) = 13.69, p < .001$ ) and greater willingness to pay ( $F(1, 192) = 13.48, p < .001$ ) for physical than digital versions of goods across all product categories.

The findings of **Experiment 3** suggest that these findings were not due to differences in perceived consumption utility. Although participants ascribed greater value to physical goods ( $F(1, 196) = 7.05, p = 0.009$ ), they believed their digital counterparts were more useful on every dimension measured ( $ps < .001$ ).

**Experiment 4** ruled out a social signaling motive. Participants exhibited the same greater preference for physical than digital versions of both high and lowbrow goods. Experiment 4 also found that estimates of the retail prices of digital and physical goods cannot explain this preference.

**Experiment 5** identified psychological ownership as a driver of the higher valuation ascribed to physical goods. College students reported their willingness to pay for buying or renting a digital or print copy of a course textbook. The willingness-to-pay gap between physical and digital versions of the textbook disappeared in the rent condition ( $F(1, 271) = 2.27, p = .13$ ). Whereas students were willing to pay more to buy than rent a physical textbook ( $F(1, 271) = 13.47, p < .001$ ), they were not willing to pay more to buy than rent the same digital textbook ( $F(1, 271) = 0.084, p = .77$ ). Similar results were obtained in a replication in which participants considered textbooks that would have no resale value after their use. Renting reduced perceived ownership and thus valuation for the physical version. Renting had a much more limited effect on the valuation of the digital version, as perceived ownership is already low for digital items.

Together, these studies reveal how psychological processes, value, and technology are intricately intertwined.

## You are What You Track: The Effect of Failing to Log an Experience on Future Use of Tracking Apps

### EXTENDED ABSTRACT

Millions of people keep track of a large range of behaviors through smartphone apps. For example, over 15 million people catalogue their outdoor runs on MapMyRun and over 1 million people record what craft beers they drink on Untappd.

Though some research has investigated how tracking goal progress can affect goal achievement (Soman and Cheema, 2004; Cohran and Tesser, 1996; Etkin, 2016), little work has examined tracking behavior itself. This is especially important to understand since many of these apps assist people in tracking their behavior; the value of Untappd is not in helping people drink more beer, but in simply helping them track the beer they drink. Hence, apps like Untappd find it critical to maintain consistent consumer engagement.

In this work, we investigate how missing the opportunity to log an activity may influence the user's likelihood of logging the next relevant activity. On the one hand, research on licensing and aspirational pursuits suggest that people may try to balance their decisions (e.g., Huber, Goldsmith, and Mogilner, 2008; Dai, Milkman, and Riis, 2014). This would predict that missing a log would make people *more* likely to log their next activity. On the other hand, prior work suggests that people often choose options that reinforce previous decisions (e.g., Dhar and Simonson, 1999; Tykocinski, Pittman, and Tuttle, 1995). This would predict that missing a log would actually lead to consistency, or that people would be *less* likely to log their next activity.

Across four studies in three different contexts, we show that missing the opportunity to log an activity—even when this “miss” is outside the person's control—decreases the user's likelihood of logging the next relevant activity. We also suggest that this effect is due to users' perceptions that their activity log is a personal representation of themselves.

**Study 1** ( $n = 150$ ) tests how being unable to log an activity in a tracking app affects subsequent likelihood to use the app. Participants imagined that they were regular users of an app that allows them to log and rank beers, and that they had just tried several new beers at a festival. Participants were told either that they had logged those beers in their app (*log* condition), that they could not log any of the beers because their phone had died (*miss* condition), or were given no information about whether they logged their beers or not (*control* condition). A one-way ANOVA revealed an effect of condition on likelihood to log a beer consumed the following week ( $F(2, 147) = 8.47, p < .001$ ). Participants in the *miss* condition were less likely to record their next beer ( $M = 5.42$ ) than participants in the *log* ( $M = 6.32; t(95) = 3.67, p < .001$ ) and *control* ( $M = 6.23; t(101) = 3.45, p < .001$ ) conditions. Participants in the *log* and *control* conditions did not differ in their likelihood to log the next beer ( $t(98) = .32, p = .75$ ).

**Study 2** ( $n = 180$ ) examines whether this effect also occurs when logging non-hedonic experiences. Students imagined that they regularly used a note-taking app, then were told that for the previous lecture, they either missed logging their notes in the app due to uncontrollable circumstances (*miss* condition) or successfully used the app (*log* condition). In addition, we manipulated whether the previous lecture covered a lot of material (*high impact* condition) or was a review (*low impact* condition). Overall, participants in the *miss* condition were less likely to use the note-taking app in future lectures ( $M = 8.34$ ) than participants in the *log* condition ( $M = 9.07; F(1, 176) = 4.56, p = .034$ ). However, there was no effect of impact on likelihood to continue logging ( $F(1, 176) = 1.83, p = .178$ ), nor was there a significant interaction ( $F(1, 176) = 0.75, p = .39$ ). These results suggest that this effect occurs even when the app is more utilitarian in nature, and regardless of the importance of the missed activity.

**Study 3** ( $n = 200$ ) replicates this effect with participants who imagined using an app to log their outdoor runs. They were told that they either logged their most recent run or missed logging due to uncontrollable circumstances. Participants who missed logging their last activity were less likely to log their next activity on the app (92.93%) than people who successfully logged their last activity (99.01%;  $X^2(1) = 4.81, p = .028$ ).

**Study 4** ( $n = 176$ ) explores the mechanism behind this effect. Using the same stimuli as study 3, we also measured the extent to which participants felt like the activity log was a personal representation of themselves (e.g., wanting the running log to be an accurate portrayal of them, wanting the log to reflect a complete account of their runs;  $\alpha = .825$ ). We again find an effect of previous logging on likelihood to log future runs ( $F(1, 174) = 5.21, p = .024$ ). We also

find that this effect was mediated by beliefs that the log represents the self (indirect effect =  $-.399$ ,  $SE = .192$ , 95% CI =  $[-.824, -.068]$ ), such that missing decreased the level of personal representation felt from the app, which in turn decreased likelihood to continue logging.

Overall, we find that when people miss the opportunity to log an experience due to uncontrollable circumstances, they are less likely to continue logging that activity. This research adds to our current knowledge of how and why people track their behaviors and suggests that these app companies may increase customer engagement by instituting ways for people to get back on track after or “make up” for a missing activity.

### “Coming Alive” Through Headphones: Listening to Messages via Headphones vs. Speakers Increases Immersion, Presence, and Liking

#### EXTENDED ABSTRACT

In recent years, individuals increasingly consume media messages, advertising, news, and entertainment through auditory mediums, such as podcasts. In fact, as of early 2013, Apple reported having over one billion podcast subscriptions (Mogg, 2013). Consumers listen to auditory media either via headphones or via speakers, yet little research exists on how these various forms of consumption influence consumer perceptions and subsequent behaviors. Oftentimes, auditory media includes appeals to make purchases or donations, requests that are heavily influenced by feelings of trust and generosity. Relative to speakers, listening to an auditory stimulus via headphones reduces felt social distance (Kallinen and Ravaja, 2007) and evidence demonstrates that decreased social distance leads to increased generosity (Charness and Gneezy, 2008). Recent studies have also shown that hearing an individual’s voice makes her seem smarter and more likeable, thus humanizing the communicator (Schroeder and Epley, 2015). We hypothesize that listening to an individual via headphones (versus speakers) will make the communicator seem more present, decreasing felt social distance and increasing trust and generosity.

In an initial experiment, we tested whether individuals anticipated that listening via headphones would result in different assessments of the communicator than listening via speakers. Participants ( $n = 102$ ) imagined listening to a woman talking about a difficult time in her life via headphones (vs. speakers, order counterbalanced). Participants expected that listening to the message through headphones would lead to significantly greater feelings of communicators’ presence, ( $M_{\text{speakers}} = 4.86$  versus  $M_{\text{headphones}} = 5.18$ ;  $t(201) = 2.09$ ,  $p = .04$ ), and that they would be significantly more immersed in the story ( $M_{\text{speakers}} = 4.49$  versus  $M_{\text{headphones}} = 5.32$ ;  $t(198) = 5.29$ ,  $p < .001$ ). However, participants did not anticipate that the mode of listening would affect their attitude toward the communicators, ( $M_{\text{speakers}} = 4.73$  versus  $M_{\text{headphones}} = 4.82$ ;  $t(198) = .617$ ,  $p = .54$ ). We next tested whether these perceptions were accurate.

In Experiment 2, stimuli consisted of 3 real messages that were recorded from university students requesting tutoring help in a challenging course. Participants were randomly assigned to one of 6 conditions in a 2 (headphones vs. speakers)  $\times$  3 (message requesting tutoring) study design. As participants in Experiment 1 had predicted, Experiment 2 participants who actually listened to a request to help via headphones, relative to speakers, indicated being more immersed ( $B = .30$ ,  $t(138) = 2.0$ ,  $p = .05$ ) in the message. However, contrary to the predictions of Experiment 1 participants, individuals who actually listened to an appeal via headphones judged the communicator significantly more positively ( $B = .29$ ,  $t(138) = 2.2$ ,  $p = .03$ ).

In experiments 3 and 4 we explore two potential behavioral consequences of these effects: increased generosity and persuasiveness. In Experiment 3, participants ( $n = 586$ ) listened to the exact clip described in Experiment 1 via headphones or speakers. Participants who listened to the message via headphones reported feeling significantly greater levels of communicator presence, ( $B = .21$ ,  $t(555) = 2.13$ ,  $p = .03$ ), and were marginally more immersed in the story, ( $B = .15$ ,  $t(555) = 1.66$ ,  $p = .09$ ). Participants again judged the communicator significantly more positively—as both warmer and more competent—when listening to the message through headphones, ( $B = .17$ ,  $t(555) = 2.18$ ,  $p = .03$ ). Further, the effect of mode of listening on communicator perceptions was fully mediated by perceived social distance. Finally, conditional on giving a donation, those who heard the message via headphones were marginally more likely to donate more ( $B = .48$ ,  $t(460) = 1.7$ ,  $p = .09$ ).

Study 4 comprises a dictator game. Participants were placed in individual rooms, assigned the role of dictator and told that they may receive a \$10 endowment for participation and may choose to share it with their ‘partner,’ a participant from a previous session. Participants listened to a prerecorded scripted message from their ‘partner,’ requesting that the dictator share a portion of their sum. One-half of the participants listened to this message via speakers while the other half listened via headphones. Interestingly, the scripted communicator, who was not a genuine speaker as in the previous studies, was viewed as less warm in the headphones condition ( $B = .33$ ,  $t(367) = 2.97$ ,  $p = .003$ ), an effect that moderated generosity: conditional on having donated any amount, participants who rated the speaker as warmer gave more money when the request was heard through headphones ( $B = 0.50$ ,  $t(290) = 2.1$ ,  $p = .03$ ). These findings suggest an unexpected moderator: authenticity. Listening using headphones may amplify beliefs about a communicator, suggesting that only communicators who are authentic get a boost in likability and persuasiveness when heard via headphones. We are currently exploring this potential moderator in a follow-up study.

These findings make a significant contribution to understanding media consumption and how mode of listening influences consumer experience and behavior. Whether consumers listen via headphones or speakers affects how close they feel to the communicator and how positively they judge the communicator. Our results provide novel insights into auditory media consumption, applicable to communicators and consumers alike.

### The Accessibility Liability: Digital Information Undermines Conceptual Understanding

#### EXTENDED ABSTRACT

The advent of the “Internet Age” has transformed the way consumers acquire, process, remember, and interact with information (e.g., Barr, et al., 2015; Macias, et al., 2015; Ward 2013a, 2013b). In parallel fashion, the rapid rise and proliferation of digital access has transformed the way firms—including educational institutions—deliver information. Digital materials such as videotaped lectures, textbooks, and online coursework complement classrooms at every level of education. More strikingly, digitally-delivered information is increasingly used as a replacement for traditional learning environments; over 5 million U.S. college students took courses online in 2013 (Allen and Seaman, 2015), and 35 million individuals enrolled in free massive open online courses (MOOCs) in 2015 (Shah, 2015).

In this research, we explore how the shift toward digital information may undermine the development of conceptual understanding. We propose that consumers’ implicit assumptions about the future accessibility of digital information may affect not just infor-

mation *storage* (memory for information), but also information *processing* (understanding of information). These assumptions about the persistent accessibility of digital information, combined with a tendency to offload responsibility for information to future-accessible external sources (e.g., Sparrow, Liu, and Wegner, 2011; Wegner and Ward, 2013), may cause consumers to devote less attention to digital information than to information communicated via traditional mediums. To the extent that encoding of factual information and development of conceptual understanding require different levels of processing, variations in depth-of-processing created by these differences in attention may undermine the development of conceptual understanding for digitally-delivered information, even when consumers are successful at storing this information in internal memory. Ironically, the same principles of accessibility that eliminate barriers to educational access may create barriers for reaping the full rewards of digitally-delivered educational interventions.

Our first experiment examines the effects of presentation format on depth-of-processing in the context of traditional (live) vs. digital lectures. We delivered three 7-minute lectures to 135 undergraduate students under one of four conditions: live, digital with future access (students watched the lectures on YouTube, and were told that they would be able to access the lecture in the future), digital without future access (students were told that they would *not* be able to access the lecture in the future), and digital baseline (students were given no information about future accessibility). Students were told that they would be tested on their “memory and understanding of the lectures,” and were prohibited from taking notes of any kind. Immediately following the lectures, participants completed a three-minute cognitive filler task designed to prevent explicit repetition and rehearsal of lecture content. Finally, participants completed a quiz assessing two key types of knowledge: memory for factual information (12 items,  $\alpha = .65$ ) and conceptual understanding (18 items,  $\alpha = .77$ ).

Planned contrasts revealed no differences between any of the three “digital” conditions on either conceptual understanding (all  $ps > .40$ ) or factual memory (all  $ps > .22$ ). Subsequent contrasts comparing the “live” condition to all three “digital” conditions revealed differences for conceptual understanding ( $F(1,131) = 6.82, p = .01$ , Cohen’s  $d = .51$ ), but not factual memory ( $F(1, 131) = 0.24, p = .63$ ). These results were confirmed by a supplementary analysis treating knowledge type (factual memory, conceptual understanding) as a within-subjects factor; a planned interaction contrast comparing within-subjects differences in knowledge type for the “live” condition vs. the three “digital” conditions was significant ( $F(1,131) = 9.49, p < .01$ , Cohen’s  $d = .54$ ).

These results indicate that digitally-delivered information is associated with decreased conceptual understanding (relative to traditionally-delivered information), even in the absence of effects on memory for factual information. Whereas prior work has focused primarily on memory deficits associated with reliance on digital resources (e.g., Sparrow, Liu, and Wegner, 2011; Wegner and Ward, 2013), our results suggest that reliance on digital information may have negative consequences for consumer knowledge even when individuals are motivated to commit this information to internal memory (and are successful in doing so). In contrast to traditional learning environments, where students employ enhanced rehearsal strategies when attempting to internally encode information that they believe will be inaccessible in the future (Eskritt and Ma, 2014) and develop high levels of understanding by extracting conceptual themes while taking paper-based notes (Mueller and Oppenheimer, 2014), consumers of digitally-delivered information may fail to develop conceptual understanding because digital sources implicitly

promise unlimited future access without requiring consumers to engage in elaborative internal processing.

The results of our first experiment also suggest that implicit assumptions about digital permanence may override explicit information about future accessibility. Although we hesitate to over-interpret null effects, the equivalence of all three “digital” conditions on both outcome measures is consistent with prior research suggesting that implicit beliefs about digital permanence are resistant to explicit claims that information has been deleted (e.g., Sparrow et al., 2011). Pervasive implicit beliefs about the future accessibility of digital information suggest that explicit interventions may be ineffective at counteracting accessibility-related deficits in depth-of-processing for digital information.

We further develop this exploration of the effects of digitally-delivered information on consumer knowledge in a set of follow-up experiments focused on both expanded breadth (e.g., comparing processing of printed pamphlets to equivalent online text) and increased depth (e.g., assessing implicit/explicit beliefs about future accessibility, manipulating attentional resources). For example, we find that imposing high cognitive load during a reading task reduces conceptual understanding of print-based information ( $F(1, 111) = 5.87, p = .02$ , Cohen’s  $d = .54$ ), but not digital information ( $F(1, 111) = 0.95, p = .22$ )—a pattern consistent with the idea that consumers devote less attention to digital information, and thus have more cognitive resources to spare.

This research suggests that consumers’ implicit assumptions about the future accessibility of digital information may affect not just information *storage* (memory for information), but also information *processing* (understanding of information). This work contributes to the emerging understanding of consumer knowledge in the “Internet Age” by suggesting that inherent features of digital information sources—specifically, ease of access and permanence of storage—may lead to unintended negative consequences.

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