Source URL / Title / Link / Authors	Relevance	Notes and Quotes	Keywords
User experience design approaches for accommodating high "need for touch" consumers in ecommerce (Løkke-Andersen, Wang and Giacalone, 2021)	• Could I demonstrate how high NFT users could be accommodated for the the Blossom & Easel website? • Some **recommendations**	• "Product presentation was found to significantly affect perceived haptic properties (weight for the knives, softness for sweaters), perceived overall quality, perceptual discrimination and experienced task difficulty" • "Lack of touch may pose a challenge for high NFT consumers in online shopping environments" • "Rathee and Rajain (2019) have even found that high NFT consumers generally prefer buying products in-store" • "A recent study … identifies that a sub-type of OPPVs, online touch surrogate videos (i.e., another person's hands haptically examining the product) have a positive effect on high NFT consumers' product evaluation experience." • "The notion of imagining sensory characteristics is known as mental imagery, which refers to the "[...] representations and the accompanying experience of sensory information without a direct external stimulus." • "Touching, manipulating, and moving a physical object will inevitably cause sound waves." • "…what gets our attention is usually the sound-producing event (e.g., the movement of an object), rather than the sound itself" • "…auditory cues subtly aid us in orienting ourselves in the physical structures and objects surrounding us." • "Perhaps because of the collective sensory information being more coherent and vivid, it might lower the customer's cognitive load in online product evaluation situations, entailing a more pleasant user experience." • "Such strategies should, if employed in practice, provide a better user experience for the customer and, in turn, ideally a higher conversion rate for the online retailer." • "…auditory haptic information congruent with visual haptic information can improve the user experience of both high and low NFT consumers in an online shopping context" • "The usefulness of congruent sounds in an online shopping scenario might depend on the extent to which the consumer is actually able to make use of the sounds they hear" • "…statistically significant effects of auditory haptic information congruent with visual haptic information (in the form of touch surrogate videos) on the participants' perception of, and user experience associated with evaluating" • "…the presence of natural auditory haptic information improved the user experience of high NFT consumers in one product category (kitchen knives), but not the other (sweaters)."	• User Experience • Need for Touch (NFT) • Sensory Marketing • Online Product Presentation Videos (OPPVs) • Online Touch Surrogate Videos • Sensory Congruency • Mental Imagery • Cognitive Load • Conversion Rate

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Need for touch and haptic imagery: An investigation in online fashion shopping Silva et al. 2021	• Increased textual information about the products qualities had a positive impact on haptic imagery. This can be emphasised in a redesign • Contradict some research in part • Some **recommendations**	• Promotes use of textual information to build level of haptic imagery • Finds no significance in showing 'zoomed' images to build haptic imagery • Questions whether some objects, such as hoodies, require little further haptic imagery due to their lack of variance and commonality • Did not find any interaction effect between NFT and pictorial/verbal information • Did not provide evidence for any significant differences in NFT between men and women	• Verbal and pictorial information • Haptic imagery • Need for touch • Perceived product quality • Purchase intention • Compensatory cues • Stimulus-Organism-Response (S–O-R) paradigm • Haptic information • High imagery words • Dual-coding theory • Autotelic

Haptic information processing and need for touch in product evaluation
 	
Jha et al. 2019
	• Good explanation of instrumental and autotelic dimensions of NFT
	• Consider the type of response that NFT motivated users elicit
		• **Thought:** I keep noticing the phrase 'moderating' but don't understand its use in this context
		• "Perceived psychological distance in the present study is defined and operationalized as the psychological distance between a consumer and a product (Trope and Liberman, 2010)."
		• Good explanation of instrumental and autotelic dimensions of NFT
		  • "Cognitive response refers to the consumer judgment of the product's perceived qualities based on the information perceived through the senses (Sternthal et al., 1978)."
		  • "Affective response is the overall positive feeling toward the product (Lazarus, 1991)."
		  • "Instrumental touch refers to an individual's goal-directed evaluation (utilitarian) of a product's performance or its purchase. It is motivation driven and corresponds to the structural elements of the product (e.g. texture, temperature and weight) (Hult et al., 2009)."
		  • "The autotelic dimension is driven by individual preferences and is highly related to hedonic aspects of touch such as seeking fun, arousal, and excitement. It captures the sensory aspects of touch elicited by the psychological reactions (Peck and Childers, 2003a)."
		• "We show that individuals with instrumental NFT motivation show a more favorable cognitive response in a touch environment than in print and no-touch environments while evaluating a haptic product. In contrast, individuals with autotelic NFT motivation elicit more affective response in a touch environment than in print and no-touch environments while evaluating a haptic product."
			• Haptic information
			• Purchase environment
			• NFT (Need for Touch)
			• Cognition
			• No-touch purchase environment
			• Autotelic and instrumental dimensions of NFT
			• Perceived psychological distance
			• Cognitive response
			• Affective response
			• Construal level theory

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Individual Differences in Haptic Information Processing: The "Need for Touch" Scale Peck and Childers (2003)	• Defines NFT • Offers a scale for NFT • Methods to encourage high and low NFT consumers to 'forgo product touch before purchase' • Some **recommendations**	• The 12-item NFT scale consists of autotelic and instrumental dimensions. - "demonstrated high reliability" in studies p439 • "In consumer behavior, evidence has been found for individual differences in terms of preference for sensory forms of information" • "some consumers touch products to simply place them in shopping carts, other consumers spend more time exploring products with their hands before ultimately making a purchase decision" - Good description, I should use this in introduction • "individuals' confidence in product judgments may be affected by whether or not they can touch a product during evaluation" • "Some consumers are likely to become frustrated by their inability to acquire this information, causing them to forgo certain nontouch shopping environments (e.g., online shopping)." • "NFT is conceptually defined as a preference for the extraction and utilization of information obtained through the haptic system" **-definition** • "This need to examine products haptically can be driven by motivations associated with what Holbrook and Hirschman (1982) describe in terms of either consumer problem solvers or consumers seeking fun, fantasy, arousal, sensory stimulation, and enjoyment" **- Consumer motivation** • "self-attributed motives corresponding to the instrumental dimension of NFT are characterized by organized analytic thought that is initiated by an explicit goal that drives behavior. In contrast, more implicit motives represented by autotelic touch reflect compulsive and affective themes intrinsic to an activity that are not elicited by reference to unmet goals" **- Instrumental v autotelic** • **P431 - Great explanation of difference between instrumental and autotelic NFT** • "for those higher in NFT, the lack of direct experience through a barrier to touch resulted in less confidence in their judgment." • P440 - BMW's iDrive given as example for product design including haptics to accommodate for high NFT users • "A way to address this may be to encourage high and low NFT consumers to have input into the product-design process" • "Brand names, low prices, or other nonhaptic compensation mechanisms (Kirmani and Rao 2000) may signal both high and low NFT shoppers to forgo product touch before purchase." • "barriers to touch inhibit the use of haptic information and consequently decrease confidence in product evaluations for high NFT, but not low NFT, individuals." • "Concrete haptic written descriptions and visual depictions of products can partially enhance acquisition of certain types of touch information (Peck and Childers 2003)" • Logitech iFeel mouse - feelable mouse? P440 (Burdea 1996) - "are these devices more effective at compensation for low versus high NFT individuals? … and important area for consumer research" • "sense of touch is thought to be the most complicated sense to replicate (Moneyline 2000)."	• Need for Touch" (NFT) scale • "Nontouch media"

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If I touch it I have to have it: Individual and environmental influences on impulse purchasing Peck and Childers. 2006	Buying impulsiveness Linking autotelic NFT (hedonic-oriented) to buying impulsiveness** • Some **recommendations**	• "Buying impulsiveness is defined as a consumer's tendency to buy spontaneously, unreflectively, immediately, and kinetically." • "Highly impulsive buyers are more likely to experience spontaneous buying; their shopping lists are more 'open' and receptive to sudden, unexpected buying ideas" (Rook and Fisher, 1995, p. 306)" • "Indirect evidence, however, suggests that product touch may influence impulse purchases, at least for some people" • "These researchers posit and find that individuals prone to impulsive behaviour are driven by hedonic gratification" • "impulsive individuals are more inclined to pick up or touch a hedonic target (in this case, a cookie) than are non-impulsives." • "Researchers appear to agree that impulse buying involves a hedonic component (Cobb and Hoyer, 1986; Hausman, 2000; Rook, 1987; Rook and Fisher, 1995; Thompson et al., 1990; Ramanathan and Menon, 2002)." • "the autotelic component of NFT relates to touch as a hedonic-oriented response seeking fun, arousal, sensory stimulation, and enjoyment (Holbrook and Hirschman, 1982). In the absence of a salient purchase goal, this autotelic component of touch corresponds to a more sensory form of processing" • "Ramanathan and Menon (2002) argue that hedonic gratification underlies most impulse behavior"** • "a positive and significant correlation is reported between autotelic NFT and an individual trait scale measuring buying impulsiveness (Peck and Childers, 2003)"** • "autotelic NFT would also be positively related to actual impulse-purchase behavior"** • **Hypothesis 1 links autotelic NFT with implies purchasing**. "Hypothesis 1 was supported with a significant main effect for autotelic NFT on impulse purchase" p768 • "individuals higher in autotelic NFT purchased more impulsively than their lower autotelic NFT counterparts." • "increasing the opportunities for consumers to touch products through both in- store displays and store layout may increase impulse purchase."	• Buying impulsiveness • Hedonic - characterised as pleasant

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In search of a surrogate for touch: The effect of haptic imagery on perceived ownership (Peck, Barger and Webb, 2013).	Links haptic imagery/imaging and touching an object to the endowment effect Agrees that haptics are key when selling clothing **Some recommendations**	• "the endowment effect" (Kahneman, Knetsch, & Thaler, 1990; Knetsch & Sinden, 1984; Thaler, 1980). • "Consumer research has shown that when individuals are given the opportunity to touch an object, they report a greater sense of ownership of the object (Peck & Shu, 2009; Shu & Peck, 2011)." • "Imaging is a cognitive process in which sensory information is represented in working memory (MacInnis & Price, 1987)." • "two general principles regarding the haptic imagery system. First, the function of haptic imagery should be similar to that of actual touch. This could include functional equivalence between imagery and perception, and the possibility that clear haptic imagery may be a cue for the retrieval of associated information (Paivio, 1975). Second, information conveyed by haptic imagery should correspond in content to information extracted by touch. For example, salient haptic attributes include softness, texture, weight, and texture; similar attributes should be present in haptic imagery." • "Product touch is a key component of consumer behavior. Whether consumers touch to obtain information or to enjoy sensory feedback, touch plays an important role in purchase decisions" • "Research on imagery and the tactile system is limited, and this extension of the literature on haptic imagery holds promise for further sensory research." • "haptic imagery may facilitate research in the area of touch" • "Our investigation of haptic imagery as a surrogate for touch suggests that the vividness of the imagery is key; the more vivid the haptic imagery, the greater the sense of physical control and the stronger the perceived ownership" • "high need for touch individuals may be more likely to spontaneously form haptic images. If this is the case, they may be disappointed with the actual product when they eventually have the opportunity to touch it. While they may be able to compensate for a lack of touch through spontaneous imagery, the end result could be decreased satisfaction." • "…clothing, where haptics play a key role in product evaluation." • "detailed product descriptions, large product photos, and free swatches. Haptic imagery could be added to the mix to further enhance consumer perceptions of merchandise"	• Endowment effect - Individuals value objects more highly if they own them • Haptic imagery • Haptic imaging • Perceived ownership
Construal-Level Theory of Psychological Distance Trope and Liberman (2010)	• We can see and hear things from further away. But objects we can touch are always close. Does haptic interactivity on devices fool us to believe we have the object in our hands/ stronger sense of ownership and feeling object's qualities? • Some **recommendations**	• "the five senses—sight, hearing, smell, touch, and taste—may be mapped along spatial distance according to the maximum physical distance of the sensed object. An object has to be in one's mouth to be tasted, it has to be within one's reach to be touched, it may be farther away to be smelled, and it can be still farther away to be heard or seen. The distant senses, sight and hearing, enable people to extend the scope of perception far beyond the range of the near senses, which are limited to the person's immediate environment (Boring, Langfeld, & Weld, 1939; see also Rodaway, 1994)." • "Similarly, touching a product might make a consumer give more weight to its feasibility properties and less weight to its desirability properties than only looking at that product."	• Mental construal • Abstraction • Mental travel • Psychological distance • Construal level theory (CLT) • Distal senses

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To what extent does need for touch affect online perceived quality?
 	
San-Martín, González-Benito and Martos-Partal, (2017)
	• Some recommendations for e-tail managers for design of online experience
	• **Recommendations**
		• "There are two main kinds of NFT: autotelic and emotional or instrumental and utilitarian (i.e. goal oriented)"
		• Interesting table of recent research on page 952
		• "a major drawback remains, namely, consumers' inability to touch and try out the product or service purchased online. The resulting information asymmetry can adversely affect the online buying process and evaluations of product quality"
		• **Recommendations given:**
		  • "Khan and Rahman (2016) recommend that e-tail managers focus on providing unique experiences to strengthen relations with customers."
		  • "retailers could provide videos or online forums about product manufacturing or product use their labels should feature precise information about the product's quality, components, price, warranty, country of origin and brand."
		  • "Firms also should study their target market to determine if their customers are more sensorial or more rational and if they believe the product needs to be touched before buying it."
		  • "To enhance perceived quality and avoid the negative effects of NFT, retailers should work to boost purchasers' e-commerce orientation: target those who tend to use technologies more, educate purchasers about using the internet to search for information and buy, foster the buying experience and increase perceived control."
		  • "content providers could design websites that mimic the appearance of a brick-and-mortar store, are easy to use and provide a responsive design"
			• Empirical study
			• Quality
			• E-commerce
			• Subjective norms
			• Impulsiveness
			• Need for touch
			• Instrumental NFT (Utilitarian/goal-orientated) (rucksacks)
			• Variables

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It is different than what I saw online: Negative effects of webrooming on purchase intentions Chung et al. 2021	• **Webrooming**	• "Webrooming is a two-stage shopping process that begins with examining product options online followed by making a purchase at an offline store." • "Our moderated-mediation analyses show that webrooming leads to lower perceived product performance, which in turn results in lower purchase intentions, and participants' Need for Touch (NFT) moderates the negative mediation effect, which is stronger with instrumental NFT than autotelic NFT." • "consumers first extensively research product options online with clear purchase intentions, and then visit a physical store to buy the product… [then]… they approach the offline evaluation phase by narrowing their attention and motivational energy onto the single or smaller set of goal-critical attributes (e.g., texture), rather than a broader range of attributes (e.g., color, size, and texture)." • "consumers' perceived product performance tends to vary by their expected product performance. Thus, if consumers' expectations for the performance of a particular attribute are heightened, the gap between the expected and the actual quality becomes larger" • "the webroomers' expectations were indeed heightened due to online reviewing of pro-ducts before the offline stage, and this led to lower perceived product performance and lower purchase intentions"	• Expectation • Multichannel shopping • Need for touch • Online shopping • Research shoppers • Two stage decision making • Webrooming
Shopping for products in a virtual world: Why haptics and visuals are equally important in shaping consumer perceptions and attitudes Vries et al. 2018	• Suggestion that inclusion of 3D images 'can compensate for the lack of certain diagnostic haptic information' • Some **recommendations**	• "major brands within various industries including the grocery sector are rapidly navigating towards opening e-commerce channels" • "an obstacle often encountered in online shopping environments is the limited scope of sensory information available for consumers to base product evaluations on – often deterring certain individuals such as those high in NFT from engaging in online purchasing activities" • "online retailers can compensate for the lack of certain diagnostic haptic information (e.g., weight) by employing verbal descriptions and/ or visuals such as 3D images to best approximate tactual experiences in reality" • "Enhancing object interactivity, and imagery in turn, has consequently been linked to numerous advantages such as eliciting positive emotions towards displayed products, heightening purchase and patronage intentions towards a website, and optimizing attitudes towards an online retailer"	• Online shopping • Interface touch • Object interactivity • Psychological ownership • Endowment effect • Online shopping enjoyment

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Customer Dissatisfaction and Satisfaction with Augmented Reality in Shopping and Entertainment Poushneh and Vasquez-Parraga	Augmented Reality could provide high-NFT consumers with a means on physical interactivity	• "The main AR attributes that produce satisfaction are rich quality of augmentation (realistic view and telepresence), elevated level of informativeness and interactivity, the availability of crucial utilities (search features, narration, quick response, and need for touch), connectivity (social features), and entertaining attributes.' • "there is a lack of research helping marketers understand what consumers expect using AR and what causes them to be satisfied or dissatisfied with it. Marketers seem to have little understanding of the AR attributes that may provide satisfactory consumer feedback as a result of consumer positive experience with AR." • "literature emphasizes the technological aspects of AR, but it neglects the role of AR in meeting consumers' needs and solving their problems (Swan and Gabbard, 2005)." • "some customers do not purchase online • because they lack product information, which in their mind makes purchase decisions risky (Kim and Forsythe, 2008a)." • "By providing additional product information (Lu and Smith, 2007), AR can create meaningful experiences for online shoppers (MacIntyre et al., 2001). The additional information enables customers to evaluate products more fully (Kim and Forsythe, 2008a) so they can make decisions with more certainty (Oh, Yoon, and Shyu, 2008)." • "Satisfaction refers to the difference between consumer's prediction of what should occur and what actually occurs (Parasuraman et al., 1988)." • "Augmented reality applications supplement reality by mapping virtual information onto real world experience. This mapping is likely to be important to consumers when purchasing clothing, glasses, furniture, so it must be considered seriously. The lack of mapping or its poor use may well contribute to consumer dissatisfaction." • "Telepresence refers to consumers' presence in an environment by means of a communication medium rather than being present in the immediate physical environment (Steuer, 1993)."	• Telepresence • Augmented Reality • Informativeness • Expected consumer experience • Actual consumer experience

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Let Me Imagine That for You: Transforming the Retail Frontline Through Augmenting Customer Mental Imagery Ability Heller et al. (2019)	Some current limitations on using AR in e-commerce	• Customer uptake of AR remains surprisingly slow (Fink 2017) • Retail customers can find it hard to imagine using AR applications (Morgan 2017). • Customers also differ widely in their beliefs regarding the benefits of AR technology, or the extent to which they feel comfortable making use of those benefits (Hilken et al. 2017). • only a small number of customers consider AR applications 'worth recommending' (Rese et al. 2017, p. 314). • We do not know how this connection contributes to a retailer's reputation building objectives by encouraging customers to share their experience and recommendation via positive WOM • Customers engage in perceptual information processing based on "a mental event involving visualization of a concept or relationship" (Lutz and Lutz 1978, p. 611). When ordering a sofa, customers employ mental imagery to generate a representation in their mind's eye and visualise the object (in various forms) in their living room (Phillips, Olson, and Baumgartner 1995) • there is an ongoing debate whether mental imagery exists for all different sensory modalities (Schifferstein 2009). • visualisation plays a central role in influencing consumer attitudes and behaviour. Conversely, lack of the ability to project a visual mental image may make customers uncomfortable with their choice or even withdraw from making a purchase decision (Luce et al. 2001; Simon 1955). • Generating a digital 3D representation of a product, embedding and transforming it in a use context, are the fundamental affordances of AR (Azuma 1997). • Our research contributes to the growing body of evidence, that offloading of mental processes to AR frontline technology benefits those with less ability to cognitively process aspects of visual information (Yoo and Kim 2014). • Results of our Field Study 5 show that for web-stores, the utilization of AR facilitates consumer choice. • By providing customers with AR experiences that allow them to offload mental imagery processing and see what products will look like in their own environment; the AR-enabled retail frontline creates feelings of fluency in a decision process (Janakiraman, Syrdal, and Freling 2016). • Our findings clearly show that to achieve processing fluency retail managers must align the AR-enabled frontline with the way that customers process mental imagery during decision-making • not all products derive the same benefit from AR-based retailing. Specifically understanding the customer fit is important. We find that AR-supported mental imagery had the biggest impact on customers who are so-called object-visualisers. These customers focus mental imagery on properties of an object (e.g., shape or colour) to the exclusion of its location or spatial relations • retailers should consider segmentation in the context of AR-enabled retailing as part of a drive towards personalized frontline experience, that can take AR retailing beyond its current applications (Grewal, Roggeveen, and Nordfält 2017; Rafaeli et al. 2017). • the AR frontline is an enabler, boosting customers' processing fluency of contextual products more than that of non- contextual products.	• Augmented reality • AR-enabled retail frontline - "potential to 'offload' customer's mental imagery processing during decision-making" • Customer frontline experience • Mental imagery • Processing fluency • Word-of-mouth intentions (WOM) • Object visualisers - These customers focus mental imagery on properties of an object (e.g., shape or colour) • Spatial-visualisers - mentally imagine location and spatial relations of products

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Exploring Online and In-Store Purchase Willingness: Associations With the Big Five Personality Traits, Trust, and Need for Touch Hermes et al. 2022		• Instrumental Need for Touch (defined as goal-motivated touch of a product) is positively related to in-store, but negatively related to online, purchase willingness • online customers displayed lower levels of NFT (San-Martín et al. (2017); however, Duarte and Costa e Silva (2020) did not confirm this finding). • Customers high in NFT, meanwhile, are willing to pay higher prices in-store and have stronger concerns with product quality online (Kühn et al., 2020). • a positive relationship between Instrumental NFT and in-store • purchase willingness joins previous studies in demonstrating that people with high levels of NFT prefer to buy products through retail channels that allow for touch, such as physical stores (Peck and Childers, 2006; Cho and Workman, 2011; Workman and Cho, 2013; Shankar and Jain, 2021). • Instrumental NFT was negatively associated with willingness to purchase online. This finding, too, is in agreement with published literature: Kühn et al. (2020) found that customers with high NFT experience stronger quality concerns when shopping online, and San-Martín et al. (2017) found that customers scoring lower in NFT were more strongly oriented toward e-commerce (although Duarte and e Silva (2020) found no association between NFT and propensity to make online purchases). • we believe that customers' fear of contracting COVID-19 might have resulted in lower levels of Autotelic NFT, and possibly also lower levels of Instrumental NFT. • Instrumental NFT negatively associated with willingness to purchase online at a significant level	• Consumer personality • Big Five • Trust • Need for touch (NFT) • Willingness to purchase, • Online shopping • In-store shopping • Cross-channel shopping