
Touch and Hand ability in product perception

Miriam Ittyerah

Contact: miriamittyerah7@yahoo.co.in

Miriam Ittyerah was Professor at the
Department of Psychology
University of Delhi
Delhi-110007

Key Words

Touch, hand, product, perception

ABSTRACT

Touch is a strong medium that expresses a variety of sensations such as pressure, temperature, vibration, shape, size and texture of objects. Therefore touch affects object perception in several ways. Besides sensation and discrimination, touching an object also enhances its value and authenticity, which in turn affects decisions of product purchase. The hands are the primary organs from which tactile information about an object is obtained. Though surface properties of the product like texture are known by touch, object recognition depends on the alignment of the product to a frame of reference. The importance of touch in product choices is evident from the fact that a consumer would like to know how heavy or soft the material feels. These qualitative aspects of the product conveyed by touch enable the consumer to make appropriate decisions about choosing products. Relying on vision provides only part of the information, whereas the incorporation of tactile information complements vision and provides convergent information that is essential for appropriate decision making in a growing market.

Touch and hand ability in product perception

The tactile modality

The impressions arising from sensations evoked by a wet cloth or a dog's nose, a jagged edge or slithering smoothness, the tickle of a feather or the weight of lead will never be experienced if we were denied of our sense of touch. Touch is a strong medium that expresses a variety of sensations such as pressure, temperature, vibration, shape, size and texture of objects. Touch conveys body language in the form of attachment between mother and infant, in peer relations as in a handshake or in intimate relations where expressions of affect are demonstrated in forms of body contact. Though touch is an essential modality for the attainment of cognitive and affective information, little more than its tacit role in socialization is been recognized. A complete understanding of tactile process cannot be obtained from studying neither visually informed nor sighted blind fold individuals in tactile or cross-modal matching conditions. When subjects are temporarily blindfolded, they are at a disadvantage of an immediate loss of sight and not having the practice of using sources of information that they may in their sighted existence totally ignore. There is also the possibility of visualizing or using spatial cues of reference from the environment to enable stimulus comparisons. Therefore studies with congenitally blind subjects are important if experiences devoid of vision have to be understood. Though all of the human body is sensitive to touch, the present focus will be on the role of the hands in the acquisition of information and its consequent effects in decisions of daily utility such as the choice and purchase of products in a growing market.

Touch as a sensory modality is considered to provide authentic information. In India from time immemorial, it was considered necessary to touch a person or an object to know its presence or reality. Vision or seeing was considered to be an illusion or 'maya' and information was authentic only after some physical contact with the object. Therefore touching an object is an assessment of its presence and inherent value. The significance of touching a product in the market is an indication of the value that could be attributed to the product. Fine varieties of grain and textiles such as silk or

wool are usually assessed by the way it feels with the fingers.

Decisions of product purchase are often associated with the value that is attributed to the product. According to John Maynard Keynes (1911-1979), there could be two values in the choice of events or items. The probability value associated to the product to be selected and the weight of evidence associated with it. This is subjective and involves the perception of the decision maker toward the quality and amount of information surrounding the probability value of the product that was obtained empirically. Keynes defined a coefficient of weight and risk. The coefficient places a weight on an empirical probability value. If the weight of evidence is strong, the probability is weighted more heavily. This explains paradoxes in decision making since some information is considered as more relevant, according to its authenticity. Therefore touching a product provides more authentic information than just seeing it or hearing about it from word of mouth.

In touching an object the stimulus may arouse cutaneous activity that may be confined to only the skin receptors, thus arousing specific sensations that are localized in the skin. This is considered to be relatively passive to sensations aroused when the skin is in concert with muscles and joints while exploring an object that consequently provides a percept of the stimulus. It is an active process that is determined by informative relations between stimuli, rather than singular sensations of pressure or warmth. Information about shapes or the surface texture of objects or their arrangements in space must be acquired by active touch that involves the movement of the fingers and palms of the hand. Katz (1935) described the rich world of information provided by touch and showed that the texture of a solid substance could be perceived by touch if there was relative motion between the surfaces of the skin. Touch conveys information about a number of different although overlapping skin sensations. Inputs can arise from vibrations or temporally spaced pulses, from pressure that gives impressions of hardness or softness, from patterns of roughness and smoothness, and dry and wet textures. Heat and cold is also sensed. The impressions can also be used to identify objects, such as spatial information from extended surfaces and the spatial relations between them. Therefore it is not a slow and impoverished modality as compared to vision (Millar 1994). Hence Katz (1935) and Revesz (1950) have argued that the hand is a kind of sense organ as different from the skin of the hand. Their

subsequent investigations in the perceptual capacities of touch led Revesz to propose an unrecognized mode of experience called haptics that involves more than the classical modalities of touch and vision.

Though touching objects seem to be an irresistible urge amongst most children and adults, there is little work relating touch to product perception. Although interpersonal touch and its relation to attitudes and behaviour has been examined (Hornik 1992), the use of touch for product perception and decision making has little been studied (Peck and Childers 2003). The 'need for touch' has been observed amongst consumers (Peck and Childers 2003) and furthermore products vary in their potency for arousing touching behaviour among consumers. Thus some information about processes in touch is essential to understand how coding by touch is effective in product perception and discrimination.

The sense modality of touch is the earliest to develop during the fetal period, followed by audition and lastly vision. Yet touch is a relatively less studied modality though the sensory and cognitive effects during development are all pervasive and lasting. Any sensation of touch arises from some movement of the tactile structure (Weber 1978). The contact of the object and the skin either compresses or expands the skin and consequently stimulates the area of contact. The skin is either compressed by movement of the object touching the skin it resists, or by movement in the area beneath the skin, which the touched object resists. Chen, Shao, **Barnes**, Childs, and Henson (2009) observed that touch perception is often associated with more than one physical property. In a study that required subjects to rate materials for confectionary wrapping from three types of textures such as card board, flexible materials and laminated materials for adjectives in a semantic differential scale, ratings against each pair of adjectives were found to be related. For example, perceptions of warmth of a surface were related to perceptions of softness; and perceptions of dryness were related to perceptions of roughness, flatness and stickiness, indicating that people's affective responses to tactile textures might depend on their combinations of perceptions of the surface.

Touch is a complex sensory modality that involves movement of the limbs besides other sensations such as temperature or pressure. The motor cortex represents limb movements from the head downwards with larger areas devoted to the lips and fingers in

primates and humans. The interconnections between the motor cortex and the cerebellum are crucial in voluntary movement, movement learning and motor control and are also connected with areas that are involved in visuospatial processing. Movement in space is also related to the way in which the tactile system adapts itself to the environment. Awareness of space has been found to be related to two main reference systems, one the self referent system whereby the individual usually relates his body midline with the object or location in external space and the other an allocentric reference of space based on knowledge of external space. It has been found that the frontal cortex, more specifically the pre frontal areas are interconnected with the parietal lobes as well as with the subcortical areas and these are also involved in the representation of space. What this evidence indicates is that the tactile system cannot be studied in isolation because any act of movement has an effect on the tactile system (Millar 1994).

The world about us consists of varying sizes and shapes of objects, some too small to be detected by the human hand and others too large for haptic exploration. The human hand can actively explore spatial scales of object sizes ranging from a few microns to several meters. Johansson and LaMotte (1983) for example found that sharp edges, only one thousandth of a millimeter high, could be felt with the fingertip. Perception of such microscopic objects reveals the powerful sensitivity of the tactile system and knowledge of the characteristics of sensitivity might help to understand how perception works.

Millar (1986) found that correlated shape and texture information that specifies a stimulus redundancy makes tactual discrimination easier and faster. Although texture characteristics of objects are perceived by both vision and touch, behavioural and neuroimaging studies have suggested that texture information is processed in qualitatively different ways, such that the type and manner of information coded differs between vision and touch. Whitaker, Simoes-Franklin and Newell (2008) observed that vision and touch differ with vision being more appropriate for discriminating texture boundaries and touch better at discriminating stimulus roughness, and these qualitative differences in information cannot be combined to enhance perceptual performance. For example, in a country like India with a large internal market for a variety of products that range in weight, texture, size and shape, touching a ready made product

is almost necessary to be able to distinguish it from many others that may not be very different from one another. In selecting grains of rice from its several varieties, it is not only touching and seeing the long grains, but also the aroma associated with it that encourages a consumer to select the product. The sensitivities conveyed by touch in product selection are almost compulsively associated in the selection of both edible items like tea or pulses and inedible items like jewelry or leather. McCabe and Nowlis (2003) discussed the need for consumers to touch a product than just see it in pictures or hear a verbal description. Materials and textiles that are expected to be soft to touch are preferred to be touched by the consumer than just seen. As compared to geometric characteristics of an object such as its shape or width, participants preferred to touch a material product such as a towel for its softness than see it, whereas for geometric products, participants preferred to see it in pictures or listen to verbal descriptions of the product than touch the product. In product perception by touch, a distinction can be made with regard to the type of haptic information extracted from products. Information can be instrumental and intrinsic to the product and more specific to the goal directed evaluation of a product or its purchase (Holbrook and Hirschman 1982). For example the choice of a toy is dependent on whether the toy is easy to handle by a child and provide recreation. In contrast autotelic forms of information are related to the sensory experience and hedonic appreciation of the product (Holbrook and Hirschman 1982). Touching a soft or a rough surface may arouse feelings of affect or revive memories. More important is the person's motivation to touch a product. Attributes of the product and characteristics of the person may affect the salience of material properties and produce value creation. It may follow then for haptically oriented consumers the confidence with which an attitude toward a product is held will be greater when they can touch the product.

Haptic cognition

The active movement of the hand over an object gives information of surface properties, such as texture and temperature from the skin, and the application of pressure or force to the object. These impressions can be used to identify objects that give spatial information about extended surfaces and the spatial relations

between them. The distinction between identifying objects by their nature and function, and identifying the spatial properties of shapes is relevant (Millar 1994). Shape perception of objects depends on spatial organization wherein the felt features have to be located by reference to each other or to some internal or external frame. Rotated objects have to be identified in relation to a coordinate frame (Millar 1994). For example if an alarm clock is felt about its face, one can easily determine its features, but if the clock is rotated or held upside down, then feeling the shape alone will not inform the exact position of the clock. It is necessary to align the clock with a frame of reference to be able to functionally discriminate it from an upright clock. Therefore identifying objects requires the ability to relate the object to a particular frame of reference in space and not only by the movement of the hand according to stimulus characteristics. Streri (2005) for example observed that when the haptic system is studied without visual control (in infants), the information gathering and processing capacities of object properties in the haptic system are relatively good.

The opportunity to touch products has been shown to have a persuasive influence on customer's attitudes and behaviours. Touching a product has been found to increase attitudes and purchase intentions toward the product and increase confidence in the evaluation of these products (Peck and Childers 2003). The need to touch in product evaluation has been linked to the placement of products in stores (Underhill 1999) and to the inability of certain products to be sold online (Citrin, Stem, Spangenberg and Clark 2003, McCabe and Nowlis 2003). A shortcoming of internet based retailing efforts is the inability of consumers to touch products during purchase and decision making processes. Citrin et al (2003) observed that women for example showed a higher need for tactile input compared to men in making product evaluations. In some instances even judgments of touch related characteristics of products may be affected by their containers (Krishna and Morrin 2007) indicating that the way containers or packets feel can also influence purchase of the product.

Most applications in marketing focus on touch that provides specific attribute information about the product. For example, packages of both Paper mate Dyna grippers and Ove Gloves have parts of the plastic cut out, allowing shoppers to explore and examine the grip of the pen and the fabric that makes the gloves heat proof.

Such efforts have been found to have an effect on purchase behavior resulting in large increases in sales for the store brand in a supermarket (Lindstrom 2005). Thus visual information of the product needs to be complemented by touch in order for effective decision making. Millar (1994) observed that in touch, the complementary information from other sources or modalities, which is needed to identify a shape differs with the size and type of object. To recognize objects by touch across differences in size, depth and composition requires convergence of different complementary information.

Touch has a higher threshold for shape information than vision (Ittyerah and Marks 2008). Since touch is more than a single sense modality, intersensory integration is a necessary source of information for tactile perception. Intersensory information is a prerequisite in marketing. Not only is the product seen for its physical characteristics but more often than not it is touched as well. In an informal straw poll of students I found that most of the students considered necessary to touch the product they would buy. The number of preferences for touching a product to assess its quality varied from 15 to 25 out of 35 students that considered it very important to touch the product before purchasing it. The complementary information conveyed by vision and touch enable choices in any market. According to Millar (1994) perception by touch depends on complementary information from tactual acuity, active movement and spatial cues that are not the same for all shapes. The differences involve the availability of reference cues. For example, description of haptically perceiving three dimensional objects such as a cup is different from raised dot patterns like the floral pattern on the cup and flat objects that are felt passively from being placed on the skin like a piece of metal. In touch, as in vision, shape perception depends on the nature and kind of complementary information. But in touch that complementary information differs for different types of tactual patterns with the size of the object, continuity of stimulation, the means of exploration, and with the task demands and prior knowledge. Seeing pictures of a product in a magazine usually gives impressions of colour more than other characteristic, but being able to feel the product gives authentic information. Electronic marketing is fairly common in some European countries. This is based on prior knowledge of the characteristics of the product. But to be able to select a new product,

touching to know its texture is quite essential (Lindstrom 2005). Therefore touch is almost essential than complementary when confronted with new items of choice and decision.

Are marketing decisions and evaluations influenced by touching a product for attribute information, or can hedonic aspects of touch also be persuasive in product selection? Peck and Wiggins (2006) examined whether hedonic benefits to touch influence decisions independent of the information gathered through touch. Peck and Childers (2003) observed that people differed in their need for touch as being instrumental or autotelic, so much so that the effects of touch are strange for some people than others. Peck and Wiggins (2006) found that the incorporation of touch into marketing messages can have a positive effect on persuasion for people who are high in autotelic need for touch. When a touch element was used, a positively valenced or neutral element was more persuasive than when a touch element that provided negative sensory feedback was used. Thus touch has a positive affective influence on persuasion. Peck and Wiggins suggest that touch can create an affective response, which can influence a customer's decision making process, even though the touch adds no product related information to the decision. There is evidence that touch can increase the compliance of shoppers (Smith, Gier and Willis, 1982). Shoppers that were touched while being approached with a request to sample a new food product were found to try the food sample and buy the product than shoppers that were approached without being touched.

Undoubtedly, the hands are mainly involved in making tactile choices and detecting differences between objects. Tactile defects in the hand leading to increased thresholds on the surface of the palms or the fingertips render the individual incapable of knowing by touch. Therefore hand actions are an essential component of tactile functions in product identification and selection. Peck and Shu (2009) observed that merely touching an object results in an increase in perceived ownership of that object. For both non owners and buyers, the value associated to an object is jointly influenced by both perceived ownership and the valence of the touch experience.

Vision and touch differ in their sensory roles during user product interactions. Blocking vision in sighted subjects while products were felt (Schifferstein and Desmet 2007) resulted in the largest loss of functional information, increased task difficulty and task duration and fostered dependency. When touch was blocked, the perceived

loss of information was considerably less. However in the total absence of vision as in congenitally blind conditions, perception by touch relies on self referent information. Self referent cues are used by adopting a body centered frame of reference so that the stimulus is aligned to the mid line of the body from which the distance, direction and location of a target within personal space can be assessed by the moving arm and fingers. Such self referent information is reliable and performance in conditions of total congenital blindness was more accurate than that of performance in sighted blindfolded conditions (Millar 1994, Ittyerah 2009). Blind children have been found to improve in proficiency when they are allowed sufficient practice with spatial tasks (Millar 1994) indicating that task performance cannot be solely attributed to vision. Furthermore, lack of sight does not affect hand ability, just as vision does neither determine the direction nor the degree of hand preference (Ittyerah 1993). In tasks such as type writing, piano playing or Braille reading (Millar 1987) the hands perform as well as each other. These are however non prehensile movements where the object is manipulated by the hand or the fingers and not grasped in the hand. In tasks using prehensile movements when the object is partly or wholly held, the evidence is sparse. For example, it has been found in blind conditions, that neither the congenitally blind nor the sighted blindfold children differ with their hands in the tactile perception of height, length, depth or volume of bricks nor in hand skills that assess different types of dexterity such as sorting and placing objects and therefore, there is no effect of hand on ability (Ittyerah 1993; 2000).

The difference between handedness and hand ability is that handedness refers to a consistent preference for one hand for executing fairly skilled actions such as writing or sewing. Hand ability refers to the potential capability of each hand for executing the same or different actions. There is evidence that the tactile matching of height, depth, breadth and volume of three dimensional objects (Ittyerah 1993) or the sorting and stacking of objects or finger dexterity does not differ between the hands (Ittyerah 2000, 2009) and there is no effect of hand on ability (Ittyerah, 1993, 2000, 2009) in blind or sighted blind folded conditions. These consistent findings indicate that general laterality does not affect ability. Ittyerah, Gaunet and Rossetti (2007) demonstrated that differences between the hands are in orientation to task performance than ability. The

left hand was found to be egocentrically oriented during a pointing task in the absence of vision and the right or preferred hand was found to be contextually oriented. Therefore the discomfort of performing with the nonpreferred hand is an out come of its egocentric orientation and not due to an absence of ability. Findings indicate no effect of hand on ability and suggest equipotentiality between the hands for both prehensile and nonprehensile actions.

The notion of equipotentiality between the hands is evident in skills of juggling, playing musical instruments like the piano, typewriting and Braille reading in the blind. It shows that the intended movement to perform the skill can be executed with either hand. Thus touching a product provides authentic information and inherent value, and tactile inspection of objects and identification of stimulus characteristics are not differentially affected by the preferred or the nonpreferred hand for neither nonprehensile actions such as in typewriting, piano playing, feeling textures etc, or in prehensile actions when the object is held within the palms of the hand and inspected for its shape or size.

In summary, touch affects product perception considerably. Not only are consumers sensitive to the need of touching a product to enable decisions of purchase, but the influence of affect that touching various surfaces may have in some people, renders a compelling need to investigate the specific hedonic attributes that are aroused while touching a product. This may arouse public sensitivity to the importance of touch in product perception.

References

- Chen, X., Shao, F., Barnes, C., Childs, T., & Henson, B. (2009). Exploring relationships between touch perception and surface physical properties. *International Journal of Design*, 3(2), 67-77.
- Citrin, A. V., Donald E. S., Eric R.S., & Michael J.L. (2003). Consumer need for tactile input: An internet retailing challenge. *Journal of Business Research*, 56, 915-922.
- Holbrook, M. B & Hirschman, E. C. (1982). The experiential aspects of consumption: Consumer fantasies, feelings and fun. *Journal of Consumer Research*, 9, 132-140.
- Hornik, J (1992). Tactile stimulation and consumer response. *Journal of Consumer Research*, 36, 434-447.
- Ittyerah, M (1993) Hand preferences and hand ability in congenitally blind children. *Quarterly Journal of Experimental Psychology*, 46B, 35-50.
- Ittyerah, M. (2000). Hand skill and hand preference in blind and sighted children. *Laterality*, 5, (3), 221-235.
- Ittyerah, M. (2009) Hand ability and practice in congenitally blind children. *Journal of development and physical disability*, 21, 329-344.
- Ittyerah, Gaunet, F, Rossetti Y (2007). Pointing with the left and right hands in congenitally blind children. *Brain and Cognition*, 64, 170-183.
- Ittyerah, M. & Marks, L.E. (2008) Intra-modal and cross-modal discrimination of curvature: Haptic touch versus vision. *Current Psychology Letters*, 24, 1-15.
- Johansson, R. S & Lamotte R H (1983). Tactile detection thresholds for a single asperity on an otherwise smooth surface. *Somatosensory and motor research*, 1, 21-31.
- Katz, D. (1989). The world of touch, edited and translated by L. Krueger. Hillsdale, NJ: Erlbaum (originally published, 1925, as Der Aufbau der Tastwelt).
- Krishna, A & Morrin, M. (2007). Does touch affect taste? The perceptual transfer of product container haptic cues. *Journal of Consumer Research*, 19, 449-58.
- Lindstrom, M. (2005). *Brand Sense: Build powerful brands through touch, taste, smell, sight and sound*. New York: The Free Press.

- McCabe D B & Nowlis S M (2003). The effect of examining actual products or product descriptions on consumer preference. *Journal of Consumer Psychology, 13*, 431-439.
- Millar, S. (1994). *Understanding and representing space. Theory and evidence from studies with blind and sighted children.* Clarendon Press, Oxford.
- Millar, S. (1986a). Aspects of size, shape and texture in touch: Redundancy and interference in children's discrimination of raised dot patterns. *Journal of Child Psychology and Psychiatry, 27*, 367-381.
- Peck, J & Childers, T. L. (2003). To have and to hold. The influence of haptic information on product judgments. *Journal of Marketing, 67*, 35-48.
- Peck, J & Wiggins, J (2006). It just feels good: Customer's affective response to touch and its influence on persuasion. *Journal of Marketing, 70*, 56-69.
- Peck, J & Shu, S. (2009). The effect of mere touch on perceived ownership. *Journal of Consumer Research, 36*, 434-447.
- Révész, G. (1950). *Psychology and art of the blind.* New York: Longman, Green. Amsterdam: North-Holland Publishing Co.
- Schiffestein, HNJ & Desmet, PMA (2007). The effects of sensory impairments on product experience and personal well being. *Ergonomics, 12*, 2026-2048.
- Smith, D. E, Joseph A. G & Willis, F. N. (1982). Interpersonal touch and compliance with a marketing request. *Basic and Applied Social Psychology, 3*, 35-38.
- Streri, A. (2005). Touching for knowing in infancy: The development of manual abilities in very young infants. *European Journal of Developmental Psychology, 4*, 325-343.
- Underhill, P. (1999). *Why we buy: The science of shopping.* New York: Simon & Schuster.
- Weber (1978). *The sense of touch.* (Translated) Experimental Psychological Society.