Physically-chemical attributes of the surface or the bulk of materials/objects.

In this definition, the concept of texture includes two aspects: geometrical configuration—the spatial constructive elements and their shape, size, orientation and distribution which will be perceived as, e.g., fine, granular, linear, etc.; and physical-chemical attributes—the dynamic characters which need energy exchange (such as mechanical, thermal, optical, etc.) with the environment, and usually perceived as warm, cold, hard, soft, shining, moist, dry, slippery, etc. We emphasize that it is necessary to discriminate between two concepts. One is texture, the other is perceived texture or texture perception.

The texture is objective, the latter is subjective. As a consequence, we also propose a definition of perceived texture: a synthesis of physiological and psychological response and impression to the geometrical configurations and physical-chemical attributes of the surface in the light of material objects.

Sensory Perception of Material Texture

Dimensions of texture perception

By grouping the high-frequency words and combing them into pairs which have bipolar meanings, e.g., warm—cold (except the associative description words), we classified them into pairs, which here we called lexicons, into four dimensions: geometrical dimension, physical-chemical dimension, emotional dimension, and associative dimension.

Geometrical dimension: this dimension describes the subjective response to the geometrical configuration of a material surface. High-frequency lexicons used in this dimension include such as: smooth—rough, fine—coarse, plain—texture, regular—irregular, linear—nonlinear, etc.

Physical-chemical dimension: this dimension describes the subjective response to the physical and/or chemical attributes of a material surface. High-frequency lexicons used in this dimension include such as: soft—hard, smooth—rough, shiny—dull, non-shiny, sticky—unsticky, etc.

Emotional dimension: this dimension describes the subjective, affective feelings which are evoked by touching the material surface. High-frequency lexicons used in this dimension include such as: pleasant—unpleasant, nice—ugly, safe—dangerous, beautiful—ugly, etc.

Associative dimension: this dimension describes the subjective association from the material, that is, to what material feelings can be transferred in the present’s experience or what image it can evoke. High-frequency lexicons used here include: material—fabric, leather, paper, wood, etc.

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Physical Testing of Material Texture

Leather Sample L1 (Aniline leather)

Physical Test Results

- Water vapour permeability – 8.7 mg/cm²/hour
- Softness – 4.2 mm
- Gloss measurement – 1.4 gloss units
- Colour measurement – purple (NCS colour S6010-R30B)
- Maximum tensile stress – 10.862 MPa
- Young’s Modulus – 5.83 MPa

GENERAL CONCLUSIONS

- The average scores recorded in the static and dynamic tactile test results (both blindfold and sighted) showed excellent agreement with confidence intervals which indicate that the results are not statistically different. This indicated that there is little difference between the blindfold and sighted testing methods.

- The average scores recorded in the static and dynamic tactile test results showed excellent agreement. This indicated that there is little difference between blindfold and sighted testing methods. The results show that the texture perception is similar for both testing methods.

- The average scores obtained in the UK for static tactile sighted tests were compared with those recorded in China. The results indicate that the UK natural leather samples and one synthetic leather sample were generally liked by the test participants.

- The UK results for both static and dynamic tactile tests indicated that the natural leather samples were perceived as hard and shiny. The synthetic leather sample was perceived as soft and dull.

- The Chinese results also showed similar trends. The leather samples were perceived as hard and shiny. The synthetic leather sample was perceived as soft and dull.

- The general spread of average scores for static sighted tactile tests was greater for the Chinese test results than for the UK test results for all samples tested (natural leather and one synthetic sample).

- The UK results for both tests and the Chinese tests indicated that the natural leather samples were perceived as comfortable and were also aesthetically appealing. The synthetic leather sample was also perceived as aesthetically appealing.

- The Chinese results also showed similar trends. The leather samples were perceived as comfortable and aesthetically appealing. The synthetic leather sample was also perceived as aesthetically appealing.

- The overall spread of average scores for static sighted tactile tests was greater for the Chinese test results than for the UK test results for all samples tested (natural leather and one synthetic sample).

- The UK results for both tests and the Chinese tests indicated that the natural leather samples were perceived as hard and shiny. The synthetic leather sample was perceived as soft and dull.

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