DISCUSSION PAPER

THE TERMINOLOGY OF FOOD TEXTURE

RONALD JOWITT
National College of Food Technology, Weybridge, Surrey, England

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Abstract. The current interest in food texture terminology and previous attempts to develop a system of definitions are noted. A systematic and comprehensive glossary of food texture terms is presented as a basis for discussion with the objective of achieving in due course a generally-agreed terminology.

"What's in a name? that which we call a rose
By any other name would smell as sweet".

Romeo and Juliet, Act 2

"'When I use a word', Humpty Dumpty said in a rather scornful tone, 'it means just what I choose it to mean – neither more nor less'".

Alice Through the Looking-Glass Ch. 6

"De gustibus non est disputandum"
(concerning taste there is no argument)

Old Latin tag

1. Introduction

The three quotations head this paper to epitomise how food science is concerned with reconciling the subjective and the objective natures of food and in particular with the relationships between its intrinsic characteristics and the sensory responses it evokes. Broadly, although taste and texture of foods may be mutually interactive, taste is essentially a chemosensory phenomenon whereas texture is mainly a physical attribute. Again, although mastication exposes the taste of food by facilitating access by flavour components to the chemoreceptors of taste and olfaction, active manipulation and mastication are essential components in both the exposure and the sensation of texture of foods. In this sense, the appreciation of texture is the more active operation involving subtle interactions between both motor and sensor components of the mastication and central nervous systems. It has long been possible to extract from many foods their characteristic flavour components for examination, identification and for flavouring other foods: the corresponding extraction of ‘texture’ is clearly not possible. For reasons such as these the science of food flavour has progressed further than that of food texture.

In any organised study of food texture it is essential for terms describing textural attributes to have generally-accepted and rational meanings. Unfortunately, despite pioneer work in this direction by Szczesniak [1–3], Sherman [4], Yoshikawa [5], Drake [6–7] and their associates there is still no generally-accepted glossary of food
texture terms. Some proposed terms are unsuitable because they are words which have quite different meanings in allied branches of learning and their different connotation in food texture would be very confusing. On the other hand other terms have been suggested which describe particular rheological properties of foods which do not correspond to any agreed textural attribute as experienced sensorily.

The author and some of his colleagues are involved currently in the work of the British Standards Institution Sub-committee FA/-/2 on Sensory Analysis which is due to consider the subject of food texture terminology. The recent Summer Program of the Food and Agricultural Engineering Department, University of Massachusetts, on 'Texturisation' provided an opportunity to obtain the reactions of participants to the author's glossary of textural terms. The purpose of the present paper is to widen the circle from which comment and discussion are invited with the objective of achieving an ultimate working glossary having general international agreement.

2. Scope and Form

2.1. Following definition of the three general terms, 'structure', 'texture' and 'consistency', textural terms are presented in what are believed to be logical and useful groupings of related properties.

2.2. It is usual for textural attributes to be described adjectivally. That form is also less clumsy to define and, accordingly, is used almost exclusively here.

2.3. Having defined a textural property adjectivally in this way – e.g. 'soft' – it follows that the attribute itself – 'softness' is also defined, ipso facto. There then arises the further need to distinguish degrees of the property, say, degrees of softness, either by reference to a standard range of materials against which any sample may be compared, sensorily or instrumentally (as in the Moh scale of mineral hardness in which a harder material in the scale will scratch softer materials in the scale), or in relation to an agreed method for assessing the magnitude of the property (as in Japan where Texturometer chart units are specified officially for certain aspects of some foods). However, such measurements largely await agreement relating methodology to perceived textural attributes.

2.4. In the following proposed definitions, those terms which have a well-defined, specific meaning in other, related fields – such as materials science – but which are used also in sensory evaluation in a way which directly conflicts with their defined, specific meaning, are deprecated or 'least preferred' (– e.g. 'elastic', 'hard'). Where no such conflict arises and the usage in both senses appears consistent, the term is preferred (e.g. brittle). When defined terms are used in defining other terms, they are italicised, thus: sticky.

3. List of Terms and Groups

3.1. General

3.1.1. Structure 3.1.2. Texture 3.1.3. Consistency
3.2. Terms relating to the behaviour of the material under stress or strain

3.2.1. Firm 3.2.9. Rubbery 3.2.18. Brittle
9. Short 17. Glutenous
10. Rubber

3.3. Terms relating to the structure of the material

3.3.1. Relating to Particle Size or Shape
3.3.1.1. Smooth 3.3.1.5. Gritty
2. Fine 6. Coarse
3. Powdery 7. Lumpy

3.3.2. Relating to Shape and Arrangement of Structural Elements
3.3.2.1. Flaky 3.3.2.5. Cellular 3.3.2.9. Glassy

3.4. Terms relating to ‘mouthfeel’ characteristics
3.4.1. Mouthfeel 3.4.7. Watery 3.4.13. Creamy

4. Proposed Definitions

(n = noun; adj. = adjective; ant. = antonym; sen. = sense(s) perceived by)

4.1. General
4.1.1. Structure, n. The nature of and relationship between component parts of a body or a material.
4.1.2. Texture, n. The attribute of a substance resulting from a combination of physical properties and perceived by the senses of touch (including kinaesthesia and mouthfeel), sight and hearing.
Physical properties may include size, shape, number, nature and conformation of constituent structural elements.

4.1.3. **Consistency**, n. (Deprecated). General term referring to the liquid state including specific characteristic such as **thick, thin, smooth, lumpy** (q.v.).

4.2. **TERMS RELATING TO THE BEHAVIOUR OF THE MATERIAL UNDER STRESS OR STRAIN**

4.2.1. **Firm**, adj. Possessing the textural property manifested by a high resistance to deformation by applied force: sen. touch: ant. **soft**.

4.2.2. **Hard**, adj. Preferred term **Firm**.

4.2.3. **Soft**, adj. Possessing the textural property manifested by a low resistance to deformation by applied force: sen. touch: ant. **firm**.

4.2.4. **Tough**, adj. Possessing the textural property manifested by a high and persistent resistance to breakdown on mastication: sen. touch: ant. **Tender**.

4.2.5. **Tender**, adj. Possessing the textural property manifested by a low resistance to breakdown on mastication: sen. touch: ant. **Tough**.

4.2.6. **Chewy**, adj. Possessing the textural characteristic manifested by a persistent resistance to breakdown on mastication: sen. touch: ant. **Short**.

4.2.7. **Short**, adj. Possessing the textural property manifested by rapid breakdown on mastication: sen. touch: ant. **Chewy**.

4.2.8. **Springy**, adj. Possessing the textural property manifested by a tendency to recover from deformation after removal of the deforming force: sen. touch, sight: ant. **Plastic**.

4.2.9. **Rubbery**, adj. Preferred term **Springy**.

4.2.10. **Elastic**, adj. (Deprecated) Term often used instead of **Springy** or **Rubbery**.

4.2.11. **Plastic**, adj. Possessing the textural property manifested by a tendency to remain deformed after the deforming force has been removed: sen. touch, sight: ant. **Springy**.

4.2.12. **Sticky**, adj. Possessing the textural property manifested by a tendency to adhere to contacting surfaces, especially the palate, teeth and tongue during mastication: sen. touch.

4.2.13. **Adhesive**, adj. Preferred term **Sticky**.

4.2.14. **Tacky**, adj. Preferred term **Sticky**.

4.2.15. **Gooey**, adj. Preferred term **Glutinous**.

4.2.16. **Glutinous**, adj. Both **Thick** and **Sticky** (q.v.).

4.2.17. **Glutenous**, adj. Both **Thick** and **Springy** (q.v.).

4.2.18. **Brittle**, adj. Possessing the textural property manifested by a tendency to crack, fracture or shatter without substantial prior deformation on the application of force: sen. touch, hearing, sight.

4.2.19. **Friable**, adj. Preferred term **Crumbly**.

4.2.20. **Crumbly**, adj. Possessing the textural property manifested by a tendency to break down easily into small, irregular particles: sen. touch, sight.
4.2.21. **Crunchy**, adj. Both **Brittle** and **Crumbly** (q.v.): sen. touch, sight, and, particularly, hearing.

4.2.22. **Crisp**, adj. (a) *As perceived in fruits and vegetables, especially apples, celery. lettuce.* Possessing the textural property manifested by a tendency when subjected to an applied force to yield suddenly with a characteristic sound: sen. touch, hearing.

(b) *As perceived in some porous, dry foods especially biscuits (crackers), potato crisps (chips).* Preferred term **Brittle**.

4.2.23. **Thick,** adj. Possessing the textural property manifested by a reluctance to flow: sen. touch, sight: ant. **Thin.**

4.2.24. **Thin,** adj. Possessing the textural property manifested by a readiness to flow: sen. touch, sight: ant. **Thick.**

4.2.25. **Viscous,** adj. Preferred term **Thick.**

4.3. TERMS RELATING TO THE STRUCTURE OF THE MATERIAL

4.3.1. **Relating to Particle Size, Shape or Character**

4.3.1.1. **Smooth,** adj. Possessing the textural property manifested by an absence of detectable solid particles: sen. touch, sight: ant. **Gritty, Lumpy, Mealy.**

4.3.1.2. **Fine,** adj. Possessing the textural property manifested by small, uniform constituent particles: sen. touch, sight: ant. **Coarse.**

4.3.1.3. **Powdery,** adj. Possessing the textural property manifested by the presence of, or readiness to break down to, very small particles: sen. touch, sight (cf. **Crumbly.**)

4.3.1.4. **Chalky,** adj. Preferred term **Powdery.**

4.3.1.5. **Gritty,** adj. Possessing the textural property manifested by the presence of small hard particles: sen. touch, hearing, sight: ant. **Smooth.**

4.3.1.6. **Coarse,** adj. Possessing the textural property manifested by large constituent particles: sen. touch, sight: ant. **Fine.**

4.3.1.7. **Lumpy,** adj. Possessing the textural property manifested by the presence of large irregular particles: sen. touch, sight: ant. **Smooth.**

4.3.1.8. **Mealy,** adj. Possessing the textural property manifested by the presence of components of different degrees of **firmness** or **toughness** (q.v.): sen. touch, sight: ant. **Smooth.**

4.3.2. **Relating to Shape and Arrangement of Structural Elements**

4.3.2.1. **Flaky,** adj. Possessing the textural property manifested by the presence of readily separated laminar structural elements: sen. touch, sight.
4.3.2.2. *Fibrous*, adj. Possessing the textural property manifested by the presence predominantly of readily-separated filamentous structural elements: sen. touch, sight.

4.3.2.3. *Stringy*, adj. Possessing the textural property manifested by the presence of separable tough (q.v.) filamentous structural elements: sen. touch, sight.

4.3.2.4. *Pulpy*, adj. Possessing the textural property manifested by a soft, plastic, wet, fibrous (q.v.) structure: sen. touch, sight.

4.3.2.5. *Cellular*, adj. Possessing the textural property manifested by a predominantly regular, voided structure: sen. touch, sight.

4.3.2.6. *Aerated*, adj. Preferred term *Cellular*.

4.3.2.7. *Puffed (Puffy)*, adj. Possessing the textural property manifested by an expanded and often distorted Cellular (q.v.) structure: sen. touch, sight.

4.3.2.8. *Crystalline*, adj. Possessing the textural property manifested by the presence predominantly of aggregates of crystals: sen. touch, sight.

4.3.2.9. *Glassy*, adj. Possessing the textural property manifested by the complete absence of detectable structural elements in a brittle (q.v.) solid: sen. touch, sight, sound.

4.3.2.10. *Gelatinous*, adj. Possessing the textural property manifested by the complete absence of detectable structural elements in a springy (q.v.) solid: sen. touch, sight.

4.3.2.11. *Foamed (foamy)* adj. Possessing the textural property manifested by a predominance of small empty or gas-filled voids in a semi-solid or liquid: sen. touch, sight.

4.3.2.12. *Spongy*, adj. Both Springy and Cellular (q.v.).

4.4. TERMS RELATING TO 'MOUTHFEEL' CHARACTERISTICS

4.1.1. *Mouthfeel*, n. Those textural attributes of a food responsible for producing characteristic tactile sensation on the surfaces of the oral cavity; the sensation thus produced.

4.2.2. *Getaway*, n. That textural property perceived as the shortness of duration of mouthfeel (q.v.).

4.4.3. *Body*, n. That textural property producing the mouthfeel sensation of substance.

4.4.4. *Dry*, adj. Possessing the textural property producing the sensation of a reduction in the free fluids in the oral cavity: ant. *wet*.

4.4.5. *Moist*, adj. Possessing the textural property producing the sensation of neither an increase nor a reduction in the free fluids in the oral cavity (cf. *Dry*, *Wet*).

4.4.6. *Wet*, adj. Possessing the textural property producing the sensation of immediate increase in the free fluids in the oral cavity.
4.4.7. Watery, adj. Possessing the textural property manifested as both wet and deficient in body (q.v.).

4.4.8. Juicy, adj. Possessing the textural property producing the sensation of a progressive increase in the free fluids in the oral cavity during mastication.

4.4.9. Oily, adj. Possessing the textural property producing the sensation of the presence of thin (q.v.) immiscible liquid in the oral cavity.

4.4.10. Greasy, adj. Possessing the textural property producing the sensation of the presence of thick (q.v.) immiscible liquid or plastic solid in the oral cavity.

4.4.11. Waxy, adj. Possessing the textural property producing the sensation of the presence of immiscible solid in the oral cavity.

4.4.12. Slimy, adj. Possessing the textural property producing the sensation of wet (q.v.) slipperiness at the surfaces of the oral cavity.

4.4.13. Creamy, adj. Possessing the textural property producing the sensation of the presence of a miscible, thick, smooth (q.v.) liquid in the oral cavity.

4.4.14. Mushy, adj. Possessing the textural property producing the sensation of the presence of wet, soft (q.v.) solids in the oral cavity.

4.4.15. Astringent  

If mouthfeel is defined as a textural property it is desirable that it should not be used to describe non-textural properties such as 4.4.15–18 listed alongside for which a new generic term e.g. 'mouthfeel sensation' should be adopted if one is required.

4.5. Discussion

All the above terms are words which have been used more or less widely to describe textural characteristics and as far as possible the common usage has been adopted in the definitions. Exceptions are those words which have acquired ambiguity or which conflict with other definitions of the same word and there is one word which has been newly created for this glossary, viz. glutenous. It would appear that the word 'glutinous' may have a different meaning in North America from its common meaning in Europe and since it cannot have more than one agreed meaning the word 'glutenous' has been created with its obvious affinity to 'gluten' to denote thick and springy and to differentiate it from 'glutinous' which from its 'glue-like' connotation is better defined as 'thick and sticky'.

Other words are undoubtedly in use in North America to describe textural attributes, but the author does not feel confident enough to submit definitions and would accordingly welcome suggested definitions for such terms which both properly describe their common usage and are consistent with the definitions already included in this glossary e.g. by using terms already defined to define the additional words. Such additional terms and any other comment on this glossary will be welcomed by both the author and the editors.
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References


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