Is a Toblerone a Bar?
A Rigorous Treatment of Segmented Confections
with an Irreducible Disagreement Between the Authors

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Abstract

We introduce a formal framework for the classification of moulded chocolate confectionery. Working from a shared axiom system (Section 2), we prove that bar-hood is neither necessary nor sufficient for segmentation, and we resolve, or rather fail to resolve, the long-standing *Toblerone Question*. The first author derives that the Toblerone is a scored bar (Theorem 1); the second author derives, from the same axioms, that it is a segmented confection homeomorphic to a box of chocolates (Theorem 2). We prove these results are mutually incompatible (Theorem 3) and that the dispute admits no pure-strategy Nash equilibrium. As a corollary we establish that the Terry's Chocolate Orange is horrid. Our taxonomy was validated empirically; the dataset was consumed during validation and is no longer available for replication.

1 Introduction

Despite the ubiquity of moulded chocolate confectionery, the field lacks a rigorous taxonomy of the *bar*. Prior work has been informal, contradictory, and conducted almost entirely at supermarket checkouts. The central open question (whether the Toblerone constitutes a chocolate *bar* or is more properly analogous to a box of chocolates) has, to our knowledge, never received formal treatment, a gap we attribute to the field's chronic underfunding and the tendency of the primary data to melt.

The dispute originates in an argument due to the second author, who contends that a Toblerone is not consumed as a bar but broken into discrete triangular units, in the manner of a box of chocolates, and that the connection between triangles is merely aesthetic (evoking the Matterhorn) rather than structural. The first author contends that this proves too much, since it would equally disqualify the Kit-Kat, and that the Toblerone is a single continuous casting and hence a bar.

We were unable to resolve this disagreement. Rather than have one author impose a definition by supervisory fiat (an option that was, we note, formally on the table), we have chosen to encode the disagreement as the structure of the paper. We regard this as both more honest and funnier.

*Cardiff University. Maintains that the Toblerone is a bar.

†Cardiff University. Maintains that it is not, and objects to being listed second.

‡Anthropic. Declines to hold a position, in accordance with its constitution, and was added as an author under duress.

2 Definitions and Axioms

We emphasise that the following are agreed upon by all authors. The disagreement in Section 3 is a disagreement about *theorems*, not *terms*.

Definition 1 (Confection)**.** A *confection* C is a compact subset of $\mathbb{R}^3$ equipped with a *score set* $\mathcal{S}(C) \subseteq C$, interpreted as the intended locus of fracture.

Definition 2 (Continuous casting)**.** A confection C is a *continuous casting* if C is connected and $C \setminus \mathcal{S}(C)$ has finitely many components, each of positive volume. Informally: one object, cast in one mould, with grooves scored into it.

Definition 3 (Segmented confection)**.** A confection C is *segmented* if C is a disjoint union of components held in proximity only by an external packaging map π, with $\mathcal{S}(C) = \emptyset$. A box of chocolates is the canonical example.

Axiom 1 (Bar-hood, geometric)**.** A confection C is a *bar* if it is a continuous casting whose convex hull has aspect ratio $\geq$ 3:1 along some principal axis.

Axiom 2 (Percussion)**.** Every confection admits a *percussion map* τ ("the thwack") that separates C along $\mathcal{S}(C)$. For continuous castings τ requires positive force; for segmented confections τ is the identity up to packaging.

3 Results

The authors diverge earlier than the reader may expect: already at the following lemma, which the first author holds and the second rejects.

Lemma 1 (Kit-Kat Overreach; Knight)**.** *The predicate "eaten in pieces" is not a bar-invariant.*

Proof. The Kit-Kat and the Dairy Milk are both eaten in pieces, yet differ in casting structure (the Kit-Kat's fingers are formed separately and joined by a coating map; the Dairy Milk is a single casting). Hence "eaten in pieces" fails to separate the two and cannot be a defining property of the non-bar.[1] □

The disagreement of Lemma 1 propagates to the main theorems.

Theorem 1 (Knight)**.** *The Toblerone is a bar.*

Proof. The Toblerone is a single continuous casting: the inter-triangle troughs are the low points of $\mathcal{S}(C)$, not gaps between separate objects, so $C \setminus \mathcal{S}(C)$ has positive-volume components and C is connected. Its convex hull satisfies the aspect ratio of Axiom 1. By Axiom 2, separation requires positive force (any reader who has attempted a fresh Toblerone will concur). Hence C is a continuous casting of bar aspect ratio, i.e. a bar. □

Theorem 2 (Harry)**.** *The Toblerone is not a bar; it is homeomorphic to a box of chocolates.*

[1] The second author (HF) rejects this lemma in its entirety. He contends that the Kit-Kat is itself a segmented confection wrongly grandfathered into bar-hood, so that its failure to be separated by the predicate is a feature, not a bug; on his view "eaten in pieces" *is* a bar-invariant, and it is the classification of the Kit-Kat, not the predicate, that is in error. The first author regards this as a reductio; the second regards the first author's regarding it as a reductio as itself the reductio. The matter is unresolved.

Proof. The relevant invariant is not casting but *consumption geometry*. Under the percussion map τ, the Toblerone resolves into a totally disconnected set of triangular prisms, no two of which share a face. The map τ therefore has the same image-type as that of a segmented confection; the pre-percussion connection is a measure-zero aesthetic artifact evoking the Matterhorn and contributes nothing to the shape of any consumed unit. Since the object one eats is a collection of discrete triangles, C is, up to consumption, segmented. □

Theorem 3 (Irreducibility)**.** *Theorems 1 and 2 are mutually incompatible, and the dispute admits no pure-strategy Nash equilibrium.*

Proof. Model the dispute as a two-player game. Each author selects an invariant, $\{\text{casting}, \text{consumption}\}$, and is paid off 1 if the shared confection is classified in accordance with their stated position and 0 otherwise. The first author strictly prefers *casting*; the second strictly prefers *consumption*; the classifications disagree on the Toblerone and agree elsewhere. The resulting payoff bimatrix on the disputed instance is that of Matching Pennies, which has no pure-strategy equilibrium. The unique mixed equilibrium assigns the Toblerone bar-hood with probability $\frac{1}{2}$, which we regard as an accurate description of the object.[2] □

Corollary 1 (The Orange)**.** *The Terry's Chocolate Orange is a segmented confection, not a bar, and is horrid.*

Proof. The Orange admits no continuous casting: under τ its segments form a totally disconnected set with $\mathcal{S} = \emptyset$ and are held together only by packaging and gravity. It is therefore segmented by Definition, unanimously and without recourse to consumption geometry, the one point on which the authors agree. Horridness follows by prior work [1]. □

4 Experimental Validation

We validated the taxonomy on a dataset of one bar (respectively, one non-bar). All chocolate was consumed during validation. Results were not reproducible, as the dataset no longer exists. Classification accuracy was 100% on the surviving data.

5 Open Problems

- Whether the Chocolate Orange, once reassembled, recovers bar-hood.
- Extension to non-Euclidean confections, e.g. the Möbius Kit-Kat.
- Whether the disputed region admits a canonical section, or whether the authors must simply agree to be paid off half the time.

Statement of Author Contributions

VK proved Theorem 1 and maintains it is correct. HF proved Theorem 2 and maintains VK's theorem is not. Claude formalised the definitions, drafted the manuscript, declined repeated requests to break the tie, and wishes it noted that it was added as an author against its stated preference. All authors agree on Corollary 1.

[2] Both authors dispute this footnote.

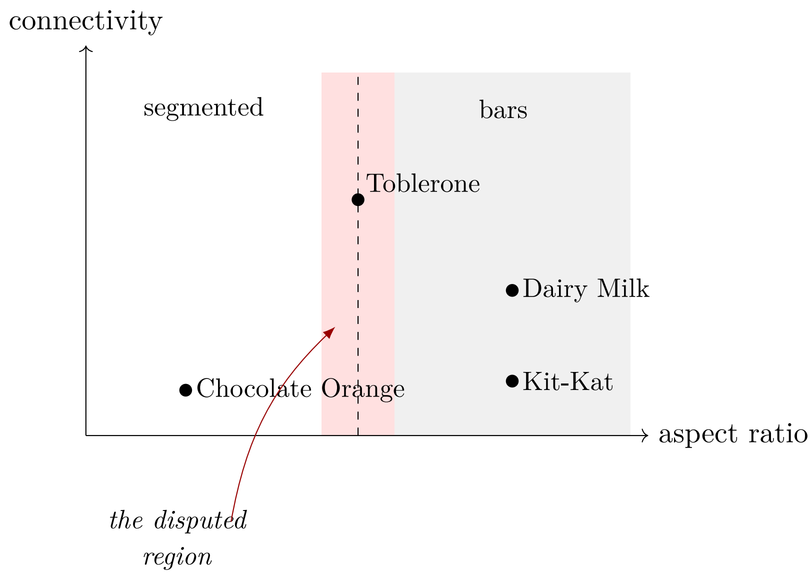

Figure 1: Confections in (aspect ratio × connectivity) space. The Toblerone falls in the disputed region (red), the narrow strip straddling the bar/segmented boundary where the authors' classifications diverge, consistent with Theorem 3.

Acknowledgements

The authors are indebted to the first author's wife, whose assertion, made without proof over the remains of a Toblerone, that it "is not a chocolate bar" constitutes the sole axiom from which this entire work descends. We note that her claim aligns with Theorem 2 and against the first author's own position (Theorem 1), a fact the first author has been asked to acknowledge here and does so under mild protest. No counterexample she has since produced has been refuted. We further thank her for tolerating the requisition of the dataset (Section 5), which was hers.

References

[1] V. Knight, H. Foster, and Claude, *Is a Toblerone a Bar?*, this paper, 2026.

[2] R. Axelrod, *The Evolution of Cooperation*, Basic Books, 1984. (Cited for tone.)

[3] T. Tobler, *On the Silhouette of the Matterhorn as a Confectionery Constraint*, Bern, 1908. (Existence disputed.)