Half of Them Answered Correctly, and One in Four Could Tell

— A triangle test is guessed right one time in three, so a correct-response rate of **0.500000** means a discriminating fraction of **0.250000** — the same rate produced by a paired comparison would mean **0.000000**, no ability at all — [Paper 553]

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September 2026

— *From thinking to syncing.* —

Abstract

In sensory work a correct-response rate is read directly as discriminating ability.What this paper shows is that the guessing floor changes what a rate means from one design to another, so that the same “half correct” means a quarter of the panel in one design and none of it in the other.No new theorem or law is claimed. First, and this is the core.Half correct on a triangle test means one panellist in four can tell——0.500000 means 0.250000, to 12 digits (Section 2). **Second, the same number means no ability in a paired comparison——0.000000, to 12 digits** (Section 2). **Third, the scale is compressed by the height of the floor——a triangle-test rate of 0.75 means only 0.625000** (Section 2). **Fourth, with 30 panellists significance begins at 15——an upper tail of 0.043482, while 14 gives 0.089771 and crosses back** (Section 3). **Fifth, that boundary lands exactly on half the panel——exactly 0.5 to 12 digits, though under Paper 405 the coincidence is not evidence of a common root** (Section 3). **Sixth, the separator is how many alternatives are offered——the floor is $1/k$, and the compression of the scale follows from that alone** (Section 4). **Keywords**: sensory evaluation, triangle test, binomial test, guessing correction, proportion of discriminators.

Scope of this paper (scope note): **No new theorem or law is claimed——the triangle test, the binomial test and the correction for guessing are standard.No sensory practice is recommended——neither how many panellists to recruit nor which design to use is stated.Panellists are assumed independent——correlation among people tested together in one room is not included.A sharp division into discriminators and non-discriminators is assumed——in reality some people are right part of the time, and the continuous model for them is not treated.Order effects and fatigue are excluded——neither presentation-order bias nor dulling over repeated trials is included.It is not said that the triangle test is the better design——a lower floor carries more information per panellist, but the task itself is harder, and that balance is not the subject.Relation to earlier papers**: **Paper 405 showed that a numerical coincidence is evidence of a common root only when there is a bijection——"half correct" looking like a coin toss is exactly such a coincidence, and the same standard is applied to the boundary at 30 panellists landing on 15.Paper 551 showed that an index watching spread hides a second kind of failure——the same shape: a reported number carries a name broader than the quantity wanted, since a correct-response rate is ability plus floor.Paper 300 showed that sharing a root is decidable——"the floor changes the meaning" and "the boundary lands on half" are separate roots.**What is added is **checking the guessing correction in both directions**, **showing to 12 digits that one rate splits into $\mathbf{0.250000}$ and $\mathbf{0.000000}$ by design**, **bracketing the significance boundary from both sides ($\mathbf{0.043482}$ and $\mathbf{0.089771}$)**, **demoting the coincidence at half the panel under Paper 405**, and **placing the separator on the number of alternatives**.

1. Notation and the Question

Setting: **in a triangle test three samples are presented, two alike and one different, and the panellist names the odd one.Anyone who cannot tell guesses, and one guess in three is right.Writing d for the fraction who can tell,**

$$p_{\text{correct}} = \frac{1}{3} + \left(1 - \frac{1}{3}\right) d$$

and in a paired comparison the $1/3$ becomes $1/2$.

Observation 1.1

the floor is the value at $d = 0$.With nobody able to tell, the rate is not zero——the origin of the scale sits at $1/3$, not at 0.

Observation 1.2

the width is compressed too.The rate can only run from $1/3$ to 1, a span of $2/3$——not only is the origin displaced, each division weighs differently.

Question: how differently does one rate read from one design to another?

2. One Rate, Two Meanings

Computation 2.1: recovering the discriminating fraction from the rate.

correct-response rate	triangle test	paired comparison
0.40	**0.100000**	−0.200000
0.50	**0.250000**	**0.000000**
0.60	**0.400000**	0.200000
0.75	**0.625000**	0.500000

Observation 2.2

this is the core.Half correct on a triangle test leaves **0.250000** who can tell, one in four——exactly a quarter, to 12 digits.

Observation 2.3

the same number means no ability in a paired comparison.**0.000000**——a number of the same shape cannot be read at all without naming the design.

Observation 2.4

both ends were checked.The floor itself gives 0 and a perfect panel gives 1, each to 12 digits——the two boundaries; either failing would mean the map is wrong.

Observation 2.5

it was run backwards too.Rebuilding a rate from the recovered **0.250000** returns 0.50 to 12 digits——a one-way check would not catch a mistaken coefficient.

Observation 2.6

below the floor the value goes negative.A rate of 0.40 read as a paired comparison gives −0.200000——a negative fraction of people means nothing. Below the floor is the range of chance, where the scale of ability does not reach.

Observation 2.7

the shape of Paper 551.There an index named for capability was governed by spread alone——here a rate named for correctness is ability plus floor. The name of the reported number is broader than the quantity wanted.

3. How Many Correct Answers Are Needed

Computation 3.1: **testing 30 panellists, at a one-sided level of 0.05.**

correct	upper tail	verdict
14	**0.089771**	not significant
15	**0.043482**	significant

Observation 3.2

both sides of the boundary.One step back exceeds 0.05 and one step on falls below it——showing only that 15 suffices would not show that it is the smallest.

Observation 3.3

the boundary lands on half the panel.15/30 is exactly 0.5 to 12 digits——and by Observation 2.2 that means a quarter of the panel able to tell is enough for significance.

Observation 3.4

under Paper 405 the coincidence is demoted.A numerical coincidence is evidence of a common root only when there is a bijection——there is no map between “the 0.05 boundary” and “half”. Change the panel from 30 and the boundary leaves half. It landed there because of the panel size, not because of the design.

Observation 3.5

the tail is monotone.More correct answers give a smaller probability——without which “the smallest significant count” would not be a well-formed phrase.

4. The Separator

Observation 4.1

the separator is how many alternatives are offered.With k of them the floor is $1/k$ and the span is $1 - 1/k$ ——not the name of the design nor the nature of the samples. The count alone decides.

Observation 4.2

a lower floor carries more information per panellist.The triangle test starts from a lower origin than the paired comparison——but the task itself is harder, so which is the better buy is not settled by the height of the floor.

Observation 4.3

separate roots under Paper 300.“The floor changes the meaning” carries $1/k$——“the boundary lands on half” carries a panel of 30 and a level of 0.05. The first does not depend on the panel size, and the second vanishes when it changes.

> **Observation 4.4**
>
> **what is not said.The triangle test is not called better——a lower floor carries more information per panellist, and the harder task takes some of it back.**

5. Roll Call and Closing

1. **a rate of 0.50 means 0.250000** (Computation 2.1): **the core, to 12 digits.**
2. **the same number means 0.000000 paired** (Computation 2.1): **unreadable without the design.**
3. **even 0.75 means only 0.625000** (Computation 2.1): **a compressed scale.**
4. **floor gives 0, perfect gives 1** (Observation 2.4): **both boundaries.**
5. **running it backwards returns 0.50** (Observation 2.5): **a one-way check misses coefficients.**
6. **paired, 0.40 gives −0.200000** (Observation 2.6): **below the floor is chance.**
7. **the boundary at 30 is 15** (Computation 3.1): **an upper tail of 0.043482.**
8. **one step back gives 0.089771** (Computation 3.1): **outside the boundary.**
9. **it lands exactly on half** (Observation 3.3): **demoted under Paper 405.**
10. **the separator is the number of alternatives** (Observation 4.1): **a floor of $1/k$.**

Closing: **In sensory work a correct-response rate is read directly as discriminating ability.Yet the guessing floor changes what a rate means from one design to another——a triangle test is guessed right one time in three, so a rate of 0.500000 means a discriminating fraction of 0.250000, one panellist in four, to 12 digits. The same number produced by a paired comparison would mean 0.000000, no ability at all, so a number of this shape cannot be read without naming the design. The scale is displaced at the origin and compressed in width, so that even a rate of 0.75 means only 0.625000. Both ends were checked, the floor giving 0 and a perfect panel giving 1, and the correction was run backwards as well, rebuilding 0.50 from the recovered quarter, since a one-way check would not catch a mistaken coefficient. Below the floor the value goes negative, a paired reading of 0.40 giving −0.200000, which means nothing: that region is chance, where the scale of ability does not reach.With 30 panellists, significance begins at 15 correct——an upper tail of 0.043482, while 14 gives 0.089771 and crosses back, so both sides of the boundary have been seen and 15 is shown to be the smallest. The boundary lands exactly on half the panel, which together with the correction means that a quarter able to tell is enough. Under Paper 405, however, there is no map between "the 0.05 boundary" and "half"; change the panel from 30 and the boundary leaves half, so it landed there because of the panel size and not because of the design.The separator is how many alternatives are offered——with k of them the floor is $1/k$ and the span is $1 - 1/k$, decided by the count alone rather than by the name of the design or the nature of the samples. Under Paper 300, "the floor changes the meaning" carries $1/k$ while "the boundary**

lands on half" carries a panel of 30 and a level of 0.05: the first is independent of panel size and the second vanishes when it changes.It is also the shape of Paper 551——there an index named for capability was governed by spread alone; here a rate named for correctness is ability plus floor. In both, the name of the reported number is broader than the quantity wanted.To be honest——no sensory practice is recommended, and neither the size of a panel nor the choice of design is stated. Panellists were assumed independent, with no correlation among people tested together, and a sharp division into those who can and cannot tell was assumed, leaving out those who are right part of the time. Order effects and fatigue were excluded. Nor is the triangle test called better: a lower floor carries more information per panellist, and the harder task takes some of it back.

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