

A Critique Of The Six-Fingered Hand

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BRONZEFINGER slowly takes off his glove, revealing his eponymous defining characteristic.

MAX: Bronzethumb!

BRONZEFINGER (*indignantly*): Bronzefinger! A thumb is a finger!

— *Get Smart*, “Bronzefinger”

The existence of real-life individuals with full-function polydactyly — having extra fully-developed, fully-formed, individually-controllable fingers on each hand — raises the question of what the experience of such a body configuration would be like. In a [previous monograph](#), I tried to approach the issue of the subjective body experience, in terms of the brain’s handling of the extra muscular control and the extra sensory inputs.

In this essay, I want to discuss the practicalities of such an anatomical configuration: not minor social matters like “where would you get gloves?”, but more innate and fundamental issues of the structure and function of the hand itself, and how that relates to everyday activities. It sounds neat to have extra body parts that you can consciously sense and control; can there possibly be a downside to this? (Besides tactless reactions from other people...)



Figure 1: Hexadactyly — The Ideal

First of all, consider what we think of when we imagine a “six-fingered hand”: naturally we think of a hand structured just like a regular five-fingered hand, just with an extra finger added (Figure 1).

However, the reality, at least for all the real-world examples I have come across, is a little different (Figure 2).



Figure 2: Hexadactyly — The Reality

What’s different? It’s subtle, but the differences are all around the thumb: note the smaller proportions of the base of the thumb, and of the gap between the thumb and the second finger. The thumb also has more limited mobility overall.

Why does this matter? To start with, it means that a common ability among those with regular hands, like being able to hold the thumb at right angles to the other fingers in the common “thumbs-up” gesture (Figure 3):



Figure 3: Fully-Opposable Thumbs-Up

becomes somewhat limited, as far as I have seen.

Let us clarify things by introducing names for some of the bones of the hand: the long bones that make up the palm are called the *metacarpals*, and the bones that make up the fingers are called the *phalanges*. The thumb normally only has two phalanges, while the other fingers have three. But to make up for this, the thumb metacarpal is (usually) much more mobile than the others, behaving almost like a third phalange.



Figure 4: Opposability Of Real Hexadactylic Thumb

However, in the real hexadactylic hand, this thumb metacarpal has more restricted movement, so more movement has to come from the other bones (Figure 4).

One question I don't know the answer to is how far a real hexadactylic thumb can bend across the palm to touch the base of the other fingers. A regular opposable thumb can manage something like this (Figure 5) with little effort:



Figure 5: Crossover of Opposable Thumb

While in the real hexadactylic hand, an additional rotation of the second finger seems needed to come into play, but I am not sure what this actually looks like (Figure 6).

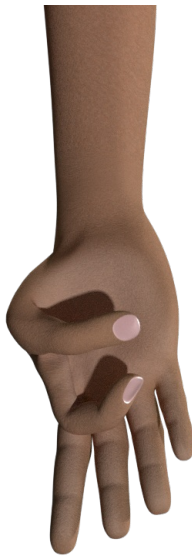


Figure 6: Crossover of Real(?) Hexadactylic Thumb

A regular thumb is also able to rotate enough to achieve an effective pinch hold with the second finger (Figure 7):



Figure 7: Fully-Opposable Thumb Pinch

The more limited rotation in the real-world hexadactylic thumb means the contact is more side-on (Figure 8):



Figure 8: Limited-Opposability Thumb Pinch

This leads to the interesting effect that six-fingered people tend not to use the second finger in this situation, instead curling it out of the way and making the pinch between the thumb and the *third* finger (Figure 9):



Figure 9: Limited-Opposability Thumb Achieves Better Pinch With Third Finger

Another peculiar characteristic I have noticed is when hexadactyls try to form a fist. You would expect it to look something like this (Figure 10):



Figure 10: Ideal Hexadactylic Fist

In fact, what tends to happen is that the *second finger rotates*, in an apparent attempt to increase the opposability of the thumb, partially overlapping the other fingers (Figure 11):



Figure 11: Real Hexadactylic Fist

Overall, it seems like the second finger is too close to the thumb to be of much use, and just gets in the way. So six-fingered people end up using only five fingers on their hands, much of the time.

Pre-Index Finger Style

One very common arrangement I have seen puts the second finger further away from the others and closer to the thumb.



Figure 12: Pre-Index Finger Style

In this configuration, that finger becomes almost opposable, like a second thumb. Some individuals do indeed tend to use this finger as their primary thumb, the actual thumb being noticeably smaller and almost being relegated to a non-functional role.

Since this finger is no longer functioning as an index finger, I propose a different name for it in this situation: the “pre-index” finger.

Hypothetical Advantages

Such polydactylic individuals often claim that their physical characteristic gives them many additional capabilities in everyday life. How realistic is this?

Holding things: Probably the most important finger in the human grip is the thumb. As we have seen, the function of this is compromised somewhat in these polydactylic individuals. It is hard to see how extra fingers can make up for this. For example, holding a broad cylindrical object like a coffee jar or drinks cup requires wide opposability between the thumb and other

fingers; reducing this must reduce the maximum diameter of cylinder that the individual can grasp with one hand.

Compare the grasp of a broad object, like a drinks cup, with a fully-opposable thumb (Figure 13):



Figure 13: Ideal Hexadactylic Grasp

with a more realistic hexadactylic hand (Figure 14):



Figure 14: Real Hexadactylic Grasp

Note how, to get more opposability in the thumb, the second and even the third finger have to be rotated out of the grip. So the number of usable fingers in the grip is reduced to four, which is one fewer than with a regular five-fingered hand.

Even the preindex configuration never quite seems to achieve the same level of opposability as a regular pentadactylic thumb (Figure 15):



Figure 15: Triphalangeal Thumb?

Playing musical instruments: This seems somewhat of a mixed bag. There are instruments like the flute and recorder, where the ability to cover up more holes at once would allow access to more notes. But given that existing versions of such instruments are designed for people with a more normal number of fingers, it would require special custom designs, with extra holes, to take advantage of such a capability.

For keyboard instruments, it's not clear what the advantage would be of being able to strike more keys at once: what would be more useful would be to strike keys across a wider interval at once, but this requires a wider reach between the thumb and last finger.

Sport: One of the members of the hexadactylic Da Silva family in Brazil plays goalkeeper in football. He says his extra fingers make it easier for him to catch the ball. This may be a genuine advantage, since the broader spread of fingers gives a bigger cross-sectional area to intercepting the ball.

Touch sensitivity: In my previous article, I surmised that the development of extra fingers should mean the growth of extra sensory nerve fibres running from those extra appendages back to the brain. So, does having more fingers mean greater sensitivity of touch in those fingers? To my knowledge, none of the polydactyls has claimed—or demonstrated—such a

capability. Is there a limitation, in that any extra nerve fibres still have to connect back to the same amount of brain tissue in the sensory cortex as in a regular pentadactylic individual? Or maybe I was wrong about the extra sensory nerve fibres altogether.

To Sum Up

Having extra working fingers seems like a wonderful gift bestowed on a fortunate few; it is just about the only physical abnormality that can be considered, not (much) as a *disability* that takes away normal function, but as a “superability” that *adds* extra function. But it comes with anatomical tradeoffs, and most of the claimed advantages would appear to be illusory. So I would say that such individuals are not, on the whole, “superior” to the rest of us.

Not by much, anyway.

