**Natural-Born Cyborgs:**

**Minds, Technologies,**

**and the Future of**

**Human Intelligence**

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From CHAPTER 2 Technologies to Bond With

Our immediate task, however, is to get a more concrete

sense of some of the complex ways in which technologies simultaneously

shape and adapt to the cognitive profiles of biological users. With that in

mind, let’s look briefly at a familiar item, one that long-ago passed from the

realm of opaque technology into that of transparent symbiotic partner—

the humble wristwatch.

We humans didn’t always keep precise, objectively measured time. Before

the dawn of the city, the factory, and the organized religious order,

human beings used natural cycles to prompt daily activities. The sun rises

and farming begins, interrupted only by a brief break when the sun is high

in the sky. Darkness signals food and sleep. Today, a great many humans

are not like this. We work all hours. We plan to meet friends for coffee at

11:45 A.M. We make a date for supper at 10:00 P.M. and a film at midnight,

and so on. The transition from a natural-time society to our present arrangements

for work and play was mediated by a long thread of technological

evolution: a thread that leads from heavy, fixed, unreliable sundials

and water clocks, through the development of early oscillating-elementbased

timekeeping, right up to cheap, accurate, personal quartz crystal

wristwatches. But the technological story, though fascinating, pales beside

the human-centered story. In a mere five hundred years, the opaque, unreliable,

fixed-location tower clocks of the Middle Ages gave way to the reliable,

cheap, personal timekeepers that we now take so much for granted.

Along the way our relationship to time itself was irrevocably changed and

transformed.

Once the average city worker was awakened by the call of the night

watch, a living person whose task was to patrol the streets shouting the

time. A little later the tolling of a bell, either owned by the town or perhaps

by a specific employer, woke the townspeople. These measures instilled a

degree of what David Landes nicely calls “time obedience.” But with the

availability of personal timepieces, in the form of chamber clocks or (ultimately)

wristwatches, came the possibility of something new and different—“

time discipline.” The presence of easily accessible, fairly accurate,

and consistently available time-telling resources enabled the individual to

factor time constantly and accurately into the very heart of her endeavors

and aspirations. This made possible ways of thought, and cultural practices

and institutions, which were otherwise precluded by our basic biological

nature. Landes makes the point well:

The public clock could be used to open markets and close them, to signal

the start of work and its end, to move people around, but it was a limited

guide to self-imposed programs. Its dial was not always in view; its bells not

always within hearing. Even when heard, hourly bells are at best intermittent reminders. They signal moments. A chamber clock or watch is something

very different: an ever-visible, ever-audible companion and monitor . . .

a measure of time used, time spent, time wasted, time lost. As such it was

prod and key to personal achievement and productivity.

Notice that what counts here is not always consciously knowing the time.

None of us, I suppose, looks constantly at his or her watch! Rather, the

crucial factor is the constant and easy availability of the time, should we

desire to know it. Therefore, a prime characteristic of transparent technologies

is their poise for easy use and deployment as and when required. Daily,

unreflective usage bears this out. As you walk down the street, you are

accosted by the familiar cry of the temporarily watchless. “Excuse me, sir,

do you happen to know the time?” Asked this question on a busy street,

most of us will unhesitatingly reply, even before consulting our wristwatches,

that yes, we surely do.6 Grasping the request hidden in the formulaic question,

many of us will also, and without further request, share our knowledge

with the time-challenged supplicant. As we do so, we may find ourselves

producing one of the characteristic body motions of the modern world. In

the suited male or female, this takes the form of a controlled, punch-like

extension of the arm, a clockwise half-rotation of the emerging wrist, and a

slight lowering of the gaze. This knowledge-retrieval tropism serves, of

course, a single practical function—it permits you to focus your gaze briefly

upon the face, dial, or display of your watch, that humble example of cyborg

technology.7

Now compare a superficially similar case. Your houseguest has encountered

a word he does not know. To be concrete, let the word be “clepsydra.”

At some appropriate conversational juncture, the question is raised: “Good

host, do you know what the word ‘clepsydra’ means?” Perhaps you are like

me. I only learned this word a few days before writing this paragraph; until

then, it wasn’t part of my working vocabulary at all. But perhaps, like me,

you keep a medium-size version of the Oxford English Dictionary somewhere

in your house. So you know you have the wherewithal to resolve the

matter. But what do you say? You surely won’t say “Yes, I know what that

word means” and only then proceed to consult the dictionary. Yet this is

precisely what usually happens when we are asked the time!

An easy dismissal of this discrepancy is, of course, to simply lay everything

at the accommodating feet of convention. When we answer that we

know the time, all we mean is that we have the information readily at hand.

And to be sure, several cultural variants of the request exist. My wife, a

native Spanish speaker, might ask me “Tienes hora?” literally, “Have you

got the time?” with the emphasis on possession rather than knowledge. All

this notwithstanding, I think the ease with which we accept talk of the

watch-bearer as one who actually knows—rather than one who can easily

find out—the time is suggestive. For the line between that which is easily

and readily accessible and that which should be counted as part of the knowledge

base of an active intelligent system is slim and unstable indeed. It is so

slim and unstable, in fact, that it sometimes makes both social and scientific

sense to think of your individual knowledge as quite simply whatever

body of information and understanding is at your fingertips; whatever body

of information and understanding is right there, cheaply and easily available,

as and when needed. According to one diagnosis, then, you are telling

the literal truth when you answer “yes” to the innocent-sounding

question “Do you know the time?” For you do know the time. It is just that

the “you” that knows the time is no longer the bare biological organism

but the hybrid biotechnological system that now includes the wristwatch

as a proper part.

To make this just a little more palatable, consider the parallel case of

biological memory. Suppose I ask you whether you know the year of the

first walk on the moon. You might answer “Yes, 1969.” In answering “yes,”

you do not mean to imply that this date was present to your conscious

awareness all along. You do not walk around all day mentally rehearsing

“1969,” “1969,” “1969.” Rather, your “yes” signifies that the information

was indeed there, poised for easy access and retrieval from your biological

memory. The informational poise of the wristwatch (and, as we’ll later see,

of the visual scene in front of your own eyes) may sometimes be relevantly

similar. Perhaps, then, you may be properly said to know the time even

before you actually look at your watch—just as you can be said to know

the date of the moon landing even before actually retrieving it from your

biological memory.

If this way of looking at things still strikes you as outlandish, you are in

good company. Most people find such a diagnosis strange, unnecessary and (thus) unconvincing. But this reaction is unprincipled. It rests not

upon any deep fact about the nature of knowledge or the preset bounds of

persons but on a simple prejudice: the contemporary version, as it happens,

of the old and discredited idea of the mind as a special kind of spiritstuff.

The idea of “mind as spirit-stuff” is no longer scientifically respectable.

Instead, mind is seen as the working of a purely physical device. In identifying

that physical device solely with the biological brain, we again make a

leap of faith, depicting the biological brain itself as the sole and essentially

insulated engine of mind and reason. This conception is the old idea of

special spirit-stuff in modern dress. A thoroughgoing physicalism should

allow mind to determine—by its characteristic actions, capacities, and effects—

its own place and location in the natural order. We should not, at

any rate, simply assume that it is correct to identify and locate the individual

thinking system by reference to the merely metabolic frontiers of skin

and skull.

We can, in any event, take away two somewhat less contentious lessons

from our discussion of modern timekeeping. The first is that transparent

(nonopaque, human-centered) technology is by no means a new invention.

It is with us already in a wide variety of old technologies, including

pen, paper, books, watches, written words, numerical notations, and the

multitude of almost-invisible props and aids that scaffold and empower

our daily thought and action. The second is that the passage to transparency

often involves a delicate and temporally extended process of co-evolution.

Certainly, the technology must change in order to become

increasingly easy to use, access, and purchase; but this is only half the

story because at the same time, elements of culture, education, and society

must change also. In the case at hand, people had to learn to value time

discipline as opposed to mere time obedience, and this transition itself,

Landes tells us, took over a hundred years to fully accomplish.