Re: Made−to−be−Borged Posthumans

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- *From*: "Logan Kearsley" <chrono.surfer@xxxxxxxxxxx>

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"Mark L. Fergerson" <mfergerson1@xxxxxxx> wrote in message news:YEtvg.2669$Mz3.1989@xxxxxxxxxxxxx

> Logan Kearsley wrote:
>
> > Suppose you're designing a posthuman with the intention of making at
> > extremely easy to add cyborg−bits to. What would it come out like?
>
> ISTM you're trying to think strictly organically (which makes some
> sense given the subject) but if it were me I'd also think
> engineering−wise. That is, what sort of environment(s) will they be
> working in, and what are they supposed to be able to do? See, an
> engineer thinks ends first, then selects from a range of available means
> to get there. So you're gonna have to go from both ends toward a desired
> middle, and you have to decide where that middle is. Trouble is, if your
> neoBorgs are going to be anywhere as versatile as an unmodified human is
> on Earth's surface (much less elsewhere), that middle will be a
> constantly moving target, neh?

Well, presumably they won't be, without their machine−bits. The whole point of cyborging is that the machine bits can make you as versatile as you want.

> Again, ISTM the organism is therefore best seen as an unspecialized
> (except for the connectivity aspect) substrate to which stuff is plugged
> in, and should be capable of unassisted survival.

Agreed on both points.

> I figure you'd want to minimize the amount of surgery needed to attach

new

> parts, and make the body especially receptive to whatever surgery is
> absolutely necessary− minimize rejection of implants, chance of

infection

where bits pass through the skin, rapid healing and all that. Bone

naturally

binds to titanium− perhaps the immune system could be programmed to

ignore

certain classes of artificial materials, and arrange for

skin/muscle/etc. to

fuse with certain structural materials.

> For a constantly controlled environment, fine, but you're describing
> an immune system so compromised that your neoBorgs probably wouldn't do
> so well on a "wild" planetary surface especially an alien one with bugs
> our immune systems have never seen. FTM considering the mold and fungus

How so? If you just program the immune system to ignore non−toxic metals and plastics, it should still do just fine against bacteria and viruses and stuff, no?

> issues on the ISS, maybe not there either. The immune system will need
> to be _upgraded_ to a more robust status than ours. Be easier to
> restrict implant interface materials to what an ordinary immune system
> already ignores, and arrange for the body's habit of "encapsulating"
> foreign bodies to be managed so the connectors etc. don't get plugged
> up. In Trek Borgs, I wanted to see a specialized form of scar tissue
> anchoring all those through−skin hoses and stuff.

Encapsulating scar tissue sounds like a good idea. Although, perhaps not too good in some cases, like, say, with a pacemaker− don't want extra scar tissue growing all around the heart.

> Side note; are you proposing a single−tier society where everybody's
> Borged, or a two−or−more−tier society with frinst altered professional
> spacers and normal passengers? "Don't put that in your soup, that's

Either one, I suppose. I was thinking at the time I wrote the top post of an all−cyborg society, but my posthuman soalr system is quite vast enough to contain lots of two−or−more−tier societies as well.

> 'spacer salt' and will kill you!" How do they get this stuff in an unfamiliar environment, eat rocks that "taste good" the way we get ordinary NaCl? Maybe special gengineered metal−rich foods?

Ideally, they wouldn't need any extra weird stuff. All of the computational and electronic stuff ought to be doable with neurons, organic semiconductors, carbon nanotubes, etc. so that lots of metals aren't necessary.

> As for attaching bits with minimal or no surgery, how about horn pads for
> screwing things to? Where might those be most conveniently placed? It's been
> shown that electrode arrays can be used to send extra sensory information to
> the brain via the skin and tongue, although at low bandwidth− how about designing special skin patches specifically for attaching artificial sensors
> without invasive surgery (just a bit of non−toxic glue)? I was thinking of
> arrays of organic semiconductors (some version of melanin could be used for
> that), wired up to extra 'empty' sections of the cortex− never hook anything
> up, and they'll eventually get taken over for other purposes, but glue on
> some extra sensors and the extra sensory cortex wires itself up to deal with
> the data. Could the same thing work in reverse for controlling artificial

> limbs? Design some extra sections of motor cortex that are just linked

to

> organic semiconductor arrays in the skin instead of muscles?

> Higher−bandwidth=closer to the brain, same as is done naturally.

Also, faster signal speed. Engineered nerve−wires that actually conduct electrons, rather than using ion cascades.

> Modified by priority of course; our nasal sensors have priority (in the sense their inputs hook in closer to the "core processor") because they're our oldest sense. Everything else goes through a lot more preprocessing before the conscious mind gets the data.
>
> OTOH you could go with distributed processing, with "slave brains" (larger−than−normal ganglia) in various places to do pre−processing before handing data off to the "main brain", also for extra data storage/memory. They wouldn't permanently specialize themselves the way normal brains do; just what you need for learning specialized "reflexes" to operate various add−ons. FTM they can be easily reconfigurable so you could download those specialized reflexes at need, writing over old ones.

That'd require some way of designing easily reprogrammable bits of brain. Not too easy to do, it seems to me. Perhaps there's some way of designing a blob of neurons / organic semiconductors to act as RAM, and another blob that acts like a processor and can't rewire itself like the main brain can. Put 'em together, and you could have bio−von−Neumann machines lining the spinal cord.

Much easier to just add unspecialized bits of brain tissue that rewire themselves for new inputs/outputs as needed, although that would be slower to adapt.

> I love the horn pads; easy to arrange for genetically. AFAIK the highest−bandwidth cell types we have are rods 'n' cones, so combine the mechanical aspect of pads with the connectivity function; they'd have roughly centered within them "retinas" prolly along with as you say below outgoing "power pins" from eel−organs. No obvious reason to have incoming power connectors, but fast−response photocytes (damn cephalopods keep butting in) to "talk" to add−ons will be useful.

Perhaps one could take photosynthesis machinery, strip out the photosystems, and replace them with leads to an electrical power source. Then you'd need

incoming power connectors so that the cyborg could recharge from an external power source, without having to eat.

Is there any particular reason that optical communication would be much better than electrical? Why not take a cone cell, strip out the opsin, and replace it with a nanowire? As for outgoing communication, for talking to the add−ons, it seems that you could either go with the sort of bioluminescence mechanisms currently extant in nature, which would be rather slow, or used organic LEDs, in which case you might as well just get rid of the LED and extend the nanowire that control it through the skin.

> There's gonna be a strong market in customizing the connectors on the hardware end because no two people will have the same connector arrangement/spacing etc. No; how about complex two−way "eyes" centered in the pads that can focus on the optical fiber arrays in standardized connectors, and small muscles to help the "power pins" plug in?

Like, say, compound eyes where every facet has both rod cells and OLEDs? How exactly would you arrange for muscles to help hold the power pins? I think perhaps my idea of what you mean by "power pin" and what your idea of a "power pin" is are somewhat different things.
(Reads below)
Ah! So, like a ring of spines that closes together to hold onto a connector in the middle?

> Biggest problem I see with add−ons is the mechanical issues; our natural limbs are integrated into the skeleton to distribute loads within the totality's structural limits. I wouldn't want to say replace my left arm with a jackhammer because it'd shake my shoulder apart. You don't just bolt stuff on anywhere; you need structural support, meaning they'll need to be anchored firmly but compliantly to bone.

Perhaps a common first explant (as opposed to an implant, you see) would be a support structure screwed into the spine and ribs to help mount further add−ons.

> It would be nice if all of the artificial bits didn't require their own power supplies. How about adding banks of muscles such as electric eels have, or some other specialized organ for generating electrical

voltages?

> Again, wire it up to organic semiconductor arrays in the skin, and just

glue

> on the electrical leads for the cyborg bits.

> > Don't see why not, except for the (hard to make conductive) glue part. Maybe metal−rich end connector organ "pins" grown from noble−metal−rich "spacer salt"? Shiny spots on the horn plates?

Providing power would be a bit more complicated than sending data. Chitin spines covered in conductive nanotubes / organic semiconductors?

> > At the moment, I've got this image in my head of something like a cross between a human fetus and a seahorse. Proportionately oversized head to

hold

> > extra brain for dealing with lots of extra artificial sensors and limbs, with the body reduced to little more than a life support and connector system for the brain. Horn plates running down the spine and ribs. We

don't

> > want the creature to be completely helpless without artificial bits− presumably it has to be born at some point, and grow up a bit, so keep

eyes

> > (but how complex? maybe we should do away with mammalian eyes and just

put

> > in a simple fixed−lens system, just enough to hold it over till it gets artificial ones, made−to−order) and arms with hands, but get rid of the legs− they'd just get in the way of replacement, and we want to minimize

the

> > amount of surgery to be done. Long, muscular abdomen filled with

electrical

> > organs. But where would be good places for input/output arrays?

Presumably

> > the head and neck would be covered with sensory−input arrays, but it

might

> > be nice to have a few scattered over the rest of the body. And what

about

> the electrical power arrays? A positive strip all down one side and a negative down the other, perhaps?
>
> Any comments / other ideas?

> Keep the base organism relatively unspecialized, as in able to get by absent all add−ons.
>
> The add−on connectors can _be_ extra (or the only) short−focus eyes, and could prolly default−modify themselves to 20−20 general−purpose "normal" eyes over a short time if they weren't connected to anything. They'll need "eyelids" to prevent accidentally shorting the power pins (no unprotected strips). Maybe go with muscled and innervated horn "fingers" with metallized inner faces to grip connectors/make electrical contact? They'd look more like ornate barnacles with eyes inside. Will need one specialized optical accessory cortex for primary data reduction/multiplexing per each.

The power pins could be the eyelids− shape them like wedges of a circle to close over the central eye, and put non−conductive horn right at the edges so they don't short each other.

Thing is, barnacle−eyes with integrated I/O and power connectors are much more complex and more limited than having separate pads for I/O and power spread over the body. Presumably, they would all carry the same voltage, and there's only a limited number of them in pre−defined spots (and it needs to be worked out how the electric organs are connected up to the various barnacle−eyes), whereas with arrays in the skin you could add as many new connections as you like until you run out of surface area.
Perhaps the body could be programmed to grow a new barnacle eye as needed in response to some primer chemical or something. Easiest to do that if the eyes are just for I/O, and power supply remains separate.

> If injured or otherwise unable to reach techy bits, open barnacle−eye, focus on add−on's input, tell it to crawl toward you on battery power.

That might be a bit of a stretch. It would require higher output, extremely good focusing ability beyond what is required for normal hook−up, and the ability for the eye to form images and the brain to rapidly switch over to image−processing mode when a barnacle−eye is disconnected.

> Redesign the legs as arms with hands for emergencies or downtime (per Lois McMaster Bujold's "quaddies"). Can walk either upright or

> quadrupedally, or brachiate regardless of gravity. All joints
> double−jointed if they spend much time in zero−gee. Circulatory system
> modified also per need.

Being able to walk upright or quadrupedally on arm−legs is probably asking a bit much. How about just restricting it to quadrupedalism in gravity?

> Barnacle−eyes on skull and neck, shoulder/hips, all four elbows and
> wrists near protruding bone/horn spurs to anchor limb extensions. Don't
> forget ittle tiny cranial lumps for the accessory cortexes.
>
> Slave brains in upper chest and lower abdomen. Extra bone cages to
> protect them.
>
> Advanced digestive system to supply metallic stuff for regrowing
> power pins when needed.
>
> Oh, and completely genetically incompatible with "normals" in case
> of, um, unforeseen interpersonal events. ;>)

No normals in my universe. Just lots of wildly different posthumans.

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My inbox is a sacred shrine, none shall enter that are not worthy.

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