

Tuesday, July 10, 2012

Dear Dad,

I hope you can read my letter this time. I actually *did* use 14-16pt font in the last one, having remembered your mention of the glasses issue and hoping to compensate for that in case it's still unresolved, but apparently I didn't compensate enough ☹ This time, I set the font to 30. I really hope that helps. If you can read this, in my next reply I could resend my last letter with a bigger font so you can

OVER
FOR
NQP

read what it said (unless you're able to get glasses or read it by then).

I just got your letter today. I read it immediately. I was greatly relieved to hear from you, as I'd started to get worried about the fact that you weren't even writing since the first two letters you sent – and Mike said you hadn't written to him at all, which worried me too. I now see from your letter that you don't have Mike's address memorized. This is his address:

431 S. 7th St

Apt 2620

Minneapolis, Minnesota 55415

Mike and I were talking about you this morning. I was telling him that I'd sent you a letter mid-week last week, and was getting concerned not to hear back yet as you'd have nothing but time to read and reply to a letter, and would—I would think—be eager to. Since I hadn't received anything as of yesterday evening, I was beginning to wonder. So I called the jail facility today, too, beginning the process of inquiring. I left a message with your "counselor" (I assume mental health counselor, like [REDACTED] [REDACTED], whose name was [REDACTED] something I think. But I haven't

received a call back yet. Now that I've received a letter from you, I don't feel quite as worried. I wasn't panicked or anything, as I figured there may be some legitimate reason, but I certainly was aware of and wondering about your lack of contact. Mike was probably more worried than I was yet, since I'd heard from you at least, but I convinced him to give it a bit more time. All the same, I'm glad to have received a reply finally (okay, so it was only like Wed-Thu that my letter would have been sent out last week, so not THAT long, but still) and know what's going on.

Reading your letter made me very sad. I am so sorry that your current position is presenting such boredom and all else for you. I don't know if you're allowed to receive anything in your current location, like books and such, but rather than wait for a response from you telling me what you can have, I thought I'd just send something. I'm guessing this letter will reach you before the book does... I went on Amazon and looked up "large print paperback" to see what types of titles might come up, and one I'd heard of (a best seller) called "The Hunger Games" was among the available titles. It's ordered, and

should ship tomorrow and reach you by Wed-Thu next week (July 19-20) at the latest—assuming the prison allows it through. Again, I can't imagine they wouldn't, since you're not in IMU for any reason but your own protection (and, for your protection, you should have reading materials!—and a way to read them...)... If it gets rejected because you're not allowed to have books, oh well, it wasn't terribly expensive and is worth that risk if there's a chance you can have it.

But please let me know what—if anything—you're allowed to have. Oh, and Mike said he was going to

write up a letter tonight too, and he might buy you a book as well. So assuming it doesn't get rejected, you might have two books coming to you, and they'll be large-print so we're *hoping* they'd be legible for you while you're waiting on a solution for the glasses.

Speaking of glasses, I looked at the website for the facility and called the mail room, and they basically told me that you need to have your Optometrist at the jail send an authorization slip to the mail room giving you an exception to receive glasses. I don't think you said

anything about the Optometrist already doing that, so I probably can't send anything yet. If you have him do that, then let me know, I'd be happy to buy you a pair off Amazon... Until then, apparently I can't send you anything but letters and, if we're lucky, books and other publications (maybe newspaper or magazine subscriptions).

Please find out the following for me:

1. What *can* you receive? Are books okay, and do they have to be paperback like the other place or is hard cover fine too? (the guidelines I found didn't specify

that I saw, other than to say sexually explicit stuff isn't okay)

2. When I was looking around at the website, regarding visitation and sending money and such, I found that to send money via online, they use a third-party company called "JPay"... Have you heard of that yet? Through that company, apparently people can correspond with inmates via email (at exorbitant prices, and it didn't seem that much faster than snail mail, given the built-in delays), can have video visits (assuming the facility allows for that, and with "visitation

approval” for the person doing the visiting, like normal... Maybe you could find out if that’s an option, then maybe Mike could video visit with you once in a while?), and buy a device called “JP3 player” (depending on the facility’s approval)—An MP3 player that is specifically approved for incarceration, I guess (but I guess each facility would still have to approve or decline it as an option). I took an interest in the JP3 player idea. I guess that you could listen to FM radio on it, or purchase and download songs to it from a kiosk

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of it after you're out so you could keep the songs. Or who knows, maybe it'd be a decent enough player that you'd want to continue using it later to listen to the music you bought there.

Please let me know. Especially about the reading glasses thing. I really want to help you stay comfortable, but I think you're the one who'd have to find out certain things or request certain options. But, once we have answers to some of those things, we can work toward getting you some accommodations if that's an option.

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sounds different and—with any luck—more comfortable (especially if the visits are that long) than the visits at PC Jail were.

One last thing, I think the main thing I said in my last letter was that I'd been delayed/forgetful to send in the questionnaires for me and John, but that I did it last week. So I don't know how long it takes to get approved, but I hope to have that soon, too.

Love you, Dad. I hope you were able to read this okay. And if you could read it but it still is a bit small for you sans-glasses, let me know and I'll add

NOTES AND QUOTES (Cont'd from NQP 094)
interaction and turn right around and under-
mine someone else's reputation for his faux pas.
It was as if he could not help himself. Most of
his more influential associates were prepared
to accept him, mistakes and all. But then
were unwilling to accept an inveterate liar,
especially when it was clear that the prophet's
lies soiled sullied the reputations of good
people and caused divisions in the church.

NQP
095

NOTES AND QUOTES (cont'd from NQP 093)
marital improprieties, did Joseph Smith
create a population segment that consisted
of the most credulous among the very
credulous? Some people have to suspend
reason to join Mormonism, but are there
some who have no ability to reason? 7/21/2012

Smith

15

NQP
094

Having Sidney act as his spokesman in such
a matter as attacking the missionaries was not
because JS was not an able public speaker.
Audiences were frequently rapt when J.S. spoke.
JS could foresee, not because of prophetic powers,
that there would be consequences to Sidney's
"Salt of the earth" address. When those con-
sequences came, he would be able to distance
himself from the cause and let the blame fall
on Sidney, just as he made Warren Parrish the
fall guy in the Keitland bank failure. / went
Ale. Joseph Smith's habit of passing the buck and
denying weaknesses and mistakes was only too
obvious to many of his closest associates.
many of them witnessed him fail to properly
handle a business transaction or social
(cont'd on NQP 095)

NOTES & QUOTES (from NQP 092)
No. But there are some men among
us who would rather make peace with
the gentiles than drive them out of
Davies County, which is what the Lord
wants us to do. "For Joseph it was first
and foremost about taking charge of
his own people." As for those who do
not want to join us in sweeping the

Missourians out of the county, we need
to send them bounding like jack
rabbits across the prairie, the lot of
them. We need to sweep them out
of the county too. "Sidney, as
spokesman, needed to convey that
message to the faithful, and warning
to those too comfortable to strike out
boldly to gain control of the county."

By driving away those who were
willing to question his financial and
(cont'd on NQP 094)

NOTES AND QUOTES (cont'd from N&P 091)

Sidney was worn out and was struggling with questions of how his family would fit into this new community, and how their needs would be provided. He was annoyed that Joseph Smith was already gearing up for battle so soon after having so soundly lost the one he waged in Kirtland. "The men in our mormontowns seem to be holding the missourians at bay," Sidney said, preparing for an argument. He could have called their enemies gentiles or non-mormons, but "missourians" embraced the fact that most of them were already settled in the state when the mormons began arriving. "Do I, a tired old man, also need to take up arms?" Sidney was twelve years older than Joseph, and he was feeling and showing the age difference.

(cont'd on N&P 093)

Joe Smith

N&P
092

NOTES & QUOTES (cont'd from NQP 090)
by nature the influence these men
wielded over this stable community
aroused his suspicions. He had just
left Kirtland, where some church
leaders had led a faction against him,
questioning his leadership due to the
failure of his bank. It was the ones who
had money and stability who opposed
him there. He could not trust men
whose foremost urge was to become
wealthy pillars of their community,
whose worldly success made them
refuse to stick their necks out.

"Brother Sidney," Joseph said as he
led my father into a private room for
their first conference since leaving
Kirtland, "I fear we need to clear this
land of some folks who do not have
the interests of Zion at heart."

(cont'd on NQP 092)

NOTES & QUOTES (cont'd from NQP 089)
So would lead to safety and Sustenance
for his family.

Following the prophet's assurance in
January 1838 with pregnant wife and small
children in tow, was the act of a man who
had no other options. But he was rewarded,
because when we arrived in Far West a few
weeks later, a comfortable two-story home
NQP in the center of the town was waiting
090 for our family.

By the time we arrived in Far West the
prophet had already been there a month
and had taken the pulse of the community.
He was ready for Spokesman Rigdon to do
his talking for him. [and was already

hatching his latest hare-brained plan.]
Brother Joseph could see that Wm Phelps,
David Whitmer and others had established
themselves as leaders of a fairly stable
community. Paralyzed and competitive
(cont'd on NQP 091)

NOTES AND QUOTES (cont'd from NQP 088)

NT 1 M
he would send them in a different direction, and they would go with little complaining. He himself would take it all in from a distance, wanting nothing more than to supplement his meager resources, so that he and Phebe might not be completely dependent on their children.

NQP 089
Sidney R. was never a good provider. He supported his family with his latest Scheme rather than through regular employment. I am hard-pressed to believe that Mormonism was anything other than one of those Schemes. When Parley P. Pratt handed my father the Book, my father knew very quickly that Joseph Smith had come up with the ultimate religious Scheme. My father spent fourteen years of his life following the prophet from one poorly-conceived plan to another, hoping only that doing

(cont'd on NQP 090)

NOTES AND QUOTES (cont'd from N&P 87)

my Father's Secret History

Is anyone ever really who we think they are?
From the time the prophet Joseph died to the
time of their own deaths decades later, my
father Sidney Rigdon and my mother Phoebe
were prophet and prophetess to a dwindling
group of devoted followers. In later
years they lived under the roof of two dif-
ferent daughters yet none of their child-
ren much less myself, knew of the regu-
lar correspondence they carried on with
members of their Church of Jesus Christ of
the Children of Zion. None of us knew of
the sacrifices this little band of ~~dev~~ dev-
otees made at our father's word. They
would send money to support their
prophet. He would assume the voice
of Jesus and remonstrate in a reve-
lation that it was not enough, they
would move one place, based on his
revelation, to build up Zion. Then

(cont'd on N&P 089)

NOTES AND QUOTES (cont'd from NQP 086)
last forever and have a continuing
impact on the world. 7/19/2012

And now, 1904, the conspirators
and most others from the First Gener-
ation of Mormons are dead, and
there is no one left but myself,

NQP Wick Rigdon, the only one of the
087 Second generation to piece the
puzzle together from tid bits of
history that have been scattered to
the four winds. But my father's
legacy is safe, for when I die I
will ask that my family burn
this manuscript and my other
papers, so that the world will
never know the secret history of
the origin of Mormonism.

(cont'd on NQP 088) 7/19/12

NOTES AND QUOTES (cont'd from NQP 085)

seeming to have a clue that those dreams were embedded in the BoM.

SMC 72

JSR would have been expected, by Joseph Jr, to read the BoM. Lucy

7

would not have been expected to read it, and evidently did not read it.

NQP

086

She writes of her husband's dreams, unaware that she exposes him as a co-author of the BoM.

086

Once Sidney Rigdon joined the conspiracy he was sworn to secrecy, loyalty and subordination to the prophet, as were all the others, incl. the prophet's father. This was their legacy, to create out of whole cloth a religion that would

(cont'd on NQP 087)

NOTES AND QUOTES (from NQP 084)

SMITH
5

he knew the prophet was no more getting his revelations from God than from a cow. At that point a pact was made, and a third or fourth member joined the conspiracy. I posit that those four were Joseph Smith, Oliver Cowdery, Joseph Smith SR, and finally Sidney Rigdon, the fabricators of Mormonism.

NQP
085

085

JS SR had dabbled in other cults, including the Wood Rodmen cult, and Swedenborgianism, and knew the dynamics of such affairs. Two of JS SR's personal dreams were written into the B of M. SR's wife Lucy Mack Smith relates her husband's dreams in her bio of her son, the prophet, not

(cont'd on NQP 086)

NOTES AND QUOTES (cont'd from NQP 083)
became the apocalyptic Book of Enoch;
in the Book of Moses, Rigdon was
no doubt familiar with the pseudepi-
graphic Book of Enoch, which had
been translated by that time.

Rigdon followed the Enoch/Zion
lore with the vision of three degrees
of glory, a vision in which his
greater knowledge coached Joseph,
who is credited with the vision.
Then Rigdon's study was to create
an organization for the church based
on his take of the primitive church.

At some point, probably during
the "translation" of the Bible, Rigdon
must have told Joseph Smith that

(cont'd on NQP 085)

SMITH
h) NOTES AND QUOTES (cont'd from NQPO82)
would give to Rigdon. Rigdon would
later write the received version that
removed astrology, folk magic, rod
witching, peep stones, transforming
it from a magic tale to a religious epic.

NQPO83
After joining the new church Rigdon
immediately began putting his imprint
on its theology and organization. He
had been studying the Bible for years,
with an eye toward discovering what
elements of the ancient Jewish and
Christian religions were not found
or properly represented in the modern
church. He began with the new
inspired Bible translation, within
which was the expansion which
(cont'd on NQPO84)

NOTES AND QUOTES (from NQP 081)
Comments like, "Sidney, this is what
you've preached for years, the restoration
of the primitive gospel. Now here it
is. You must accept it or be damned."
That would have raised Rigdon's hackles.

Just as Rigdon went on a pilgrimage
to Bethany, Virginia to meet Alexander Campbell,
he now went with PP Pratt to Manchester,
N.Y. to meet the prophet Joseph.

Pratt showed Rigdon what he himself
had marvelled at, all the holes excavated
in the Hill Cumorah, in the effort
to find the gold plates. According
to Martin Harris, the plates would be
moved by demons every time the
dig almost reached the Stone Box.
That would be the account Pratt

(Cont'd on NQP 083)

NOTES AND QUOTES (from NQP 080)

③ This is what Parley did later when a Shaker community rejected Mormonism. Parley was feisty, maybe as far as pugilistic, which is probably what got him killed in Arkansas, running away with another man's wife. And his murder led to the retaliatory Mountain Meadows massacre a few years later. Maybe Parley was still getting his way in death. 7/19/2012

NQP 081
On the way back from their mission to the tribes, O & P stopped in Ohio to see Parley's minister Sidney Rigdon, an man as generally stubborn as Pratt. Rigdon delayed his conversion long enough to ensure that Parley Pratt did not get credit for it.

PPP no doubt badgered Rigdon, as would seem to be Pratt's style, with
(cont'd on NQP 082)

steve.jensen@wvc-ut.gov

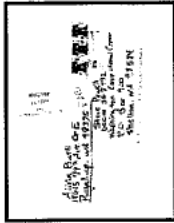
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July 25, 2012 Steve Jensen's Mail Page 1 of 26
Tuesday, July 24, 2012

Dear Dad,

I hope you can read my letter this time. I actually did use 36-10cc here on the line and, having communicated your mission of the plastic disk and having to communicate the fact that in case of a well-known event, the appearance of a disk is quite enough. This time, I let the line be 36. I really hope that helps. If you can read this, in my next reply I would read my last letter with a bigger font so you can

2

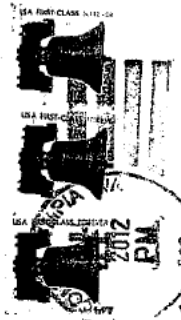
July 25, 2012 Steve Jensen's Mail Page 2 of 26
mail with a disk (which you're while to get down or read a letter).
I just got your letter today. I was a little surprised. I was a little surprised to hear from you, as I did know to get worried about the fact that you weren't coming with the fact that you were here you were - and like you said you didn't write to him at all, which surprised me too. I know how from your letter that you don't have a letter's address. This is the address:

431 E. 17th St
Ann Arbor
Michigan 48106-3545

3

July 25, 2012 Steve Jensen's Mail Page 3 of 26
Dear dad I want to tell you about you this morning. I was talking about it to you a letter (which I had read).

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INTELLIGENCE/INVESTIGATIONS



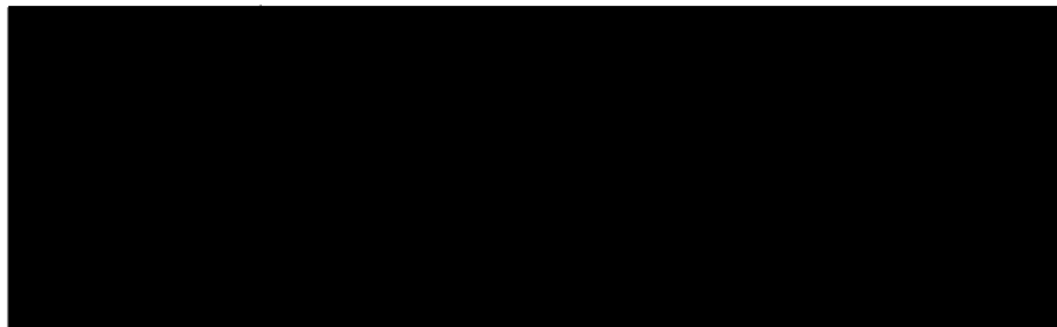
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98375
Steve Powell



9855430974

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another 5-10pts to it or something if I have to in the next letter.

Love,
Alina

Love you,
hope you can
read this letter.

P.S. Hope this gets to
you! Lots of pages!
I added extra stamps, to
the envelope. Haha.

RECEIVED
JUL 13 2012
WCC
INTELLIGENCE/INVESTIGATIONS



MINNEAPOLIS MN 554

JUL 13 2012 PM 31

Michael C Powell

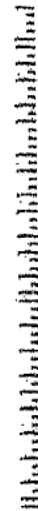


Steven C Powell

B240



98564 999955



RECEIVED

JUL 13 2012

10 July 2012

Dear Dad, WCC
INTELLIGENCE/INVESTIGATIONS

I just found out that your glasses broke. Last week I was getting a little upset because I had not heard from you, as I normally do, since you had been in the new facility. Alina told me about how they sent you to solitary confinement, so I figured we might just have to write letters for a little while. But this week I was starting to get very anxious not having received a letter because I thought they were barring you from communicating so they could beat you up every day or something. I'm relieved to hear that this is the problem but I'm so

sorry. You must be miserable not being able to see or read.

When Lin told me that, it made me think of that Twilight Zone episode where the guy wakes up and realizes that he's all alone in the world, so now that there are no more people around to bug him, he can just read all the books that are lying around in the library. But as soon as he sits down to read, he drops his glasses and they break on a stone.

Lin said there might be a way for you to call from some phone in the courtyard or something and we're going to try to figure out how to make it happen. She said she was working on getting your glasses taken care of. In the meantime,

we're going to try to get you some reading material that you can see.

I've been keeping busy on school stuff. Last week I presented to the group (at the meeting of our labs). My topic was on language and neuroimaging; I was covering a couple experiments and had a lot of material. They had me present for an hour again this week because it's not that often that we talk about language stuff at that meeting.

I think I'm getting close to a point where we might run this experiment. I hope so. There were a couple issues I had to address, and there may be more. I'll feel a lot better once this thing is through the MEG. The editing has been a real

pain in the neck, although I came up with some ideas (right at the end, as always) about how to speed up the process if I ever have to do this again. The experiment is also not going to be fun for whatever poor sap has to sit for it (that poor sap is probably me, to begin with). But I'm hopeful that the data will be good. We'll see.

The PhD stuff is really time-consuming, and I'm basically focusing all my attention on that, and on ensuring that no funny stuff goes on in these legal issues. I'm sure these people will do everything they can to try to get their hands on some money they're not

entitled to, but with any luck the law will be observed.

I know that there are other things you want to do but it all just takes so much time. We're noticing that there are also a lot of setbacks. I see the legal proceeding that's already begun as a much higher priority and more impactful on so many different levels.

I'm also catching wind that Alina's website is a major problem for our harassers. I heard about some compliments and positive reviews re the site. Apparently she's spelling out some facts that are very inconvenient for the police as they desperately try to shift the blame for their botched investigation to

anyone they can. I'm sort of getting the impression that all those people are pretty much afraid to poke their head out their front door these days.

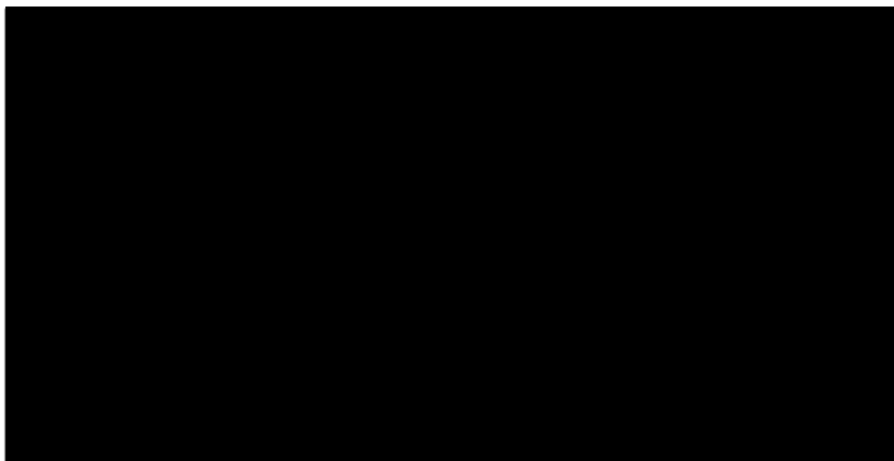
Listen, I'd like you to focus all your energy on staying safe, healthy, and sane while you're in there. And remember to stay on everybody's good side so they give you extra dessert and whatever. I know it sucks not feeling like you can do anything about the situation out here but I think things are going fine for now. I'm going to keep checking up to see that your needs are met. Fortunately I'm not so strapped for time now that these presentations have subsided. Alina also mentioned to me that the food was more

edible in that facility and I'm glad to hear that at least.

You have a lot of people out here that really love you and are waiting for your safe return.

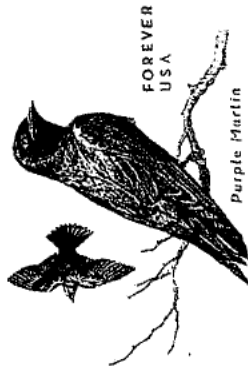
Love,

Michael



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STEVEN POWELL



ALINA POWELL

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MAY BE UNCENSORED.

7/15/2012 Sunday July 15

Dear Ahina, (and for John & Michael)

I was able to speak to Michael on the phone yesterday and today, but was unable to get through to you. I think you may have to set up your own account so my calls will be "prepaid" and not "collect." Either that or see if Michael can set you up on his account.

Getting readable letters from both you and Michael boosted my morale a lot. I have been feeling isolated lately.

Visits here are through a glass divider (for inmates) like the jail. Why don't you wait till I get to parent institution. That can't be more than two weeks away.

Yesterday morning I gave a kite to the medical person who does a welfare check every morning at each cell. She said the woman who handles it will be in on Monday (tomorrow). I asked her to let me know as soon

7/15/2012-1

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As the mail room is approved to receive reading glasses for me from the outside. Maybe you can call someone in medical and find out if it's been handled.

As for the JPB players, I overheard a conversation (yesterday, coincidentally) between two inmates. The one "in the know" said it had taken three months to get his JPB player, and the quality was comparatively low. He also said downloads from the BIOSK aborted without finishing the job. I think I'd rather wait and get more info.

As for personal books, I don't know if they will let me have them here. But they will probably be held in my property to be used at the parent inst. Hunger Games sounds familiar, and I may have read a review. I am looking forward to it, and hope I can read it as soon as I get it.

7/15/2012-2

There's a little 13" diag TV in each cell here, but I am not one with TV privileges, so mine is unplugged. I have been in a total news blackout for four weeks. I would love to read the Economist, Time or Christian Science Monitor, but will probably have that opportunity soon. Before you go out and subscribe to anything, I want to see what's in the prison library. I understand I can buy a TV with head phones, but then have to pay \$5.00 per month for cable. I enjoy watching news and talking heads. I do not even know if our family's story is being battered about.

Hopefully I will get glasses this coming week, if I'm not already moved to the parent institution, which is now my worry. I'm afraid you'll send glasses and it will take weeks for them to catch up to me.

You can resend that earlier letter in 30pt if you don't think I will get glasses this week, and if there is

7/15/2012-3

info in your letter you think I would be anxious to hear about.

The guy "Rick" you say may be my counselor, could be a guy I met for the first and last time Friday July 6. He seemed more concerned about not putting me where I would waste a bed someone in a different category could use (like in Twin Rivers Unit, which I have been told is a good place to be) than anything else. He was concerned about my notoriety due to (his words) "what my son did," but said I should be in a minimum-security facility. He specifically mentioned the Cedar Creek Correctional Center, a camp south of Tumwater. I'm not sure I like the idea, because all the inmates I worked with in the CI office, warehouse, and as installers are pulled from Cedar Creek every day.

7/15/2012-4

It was a Cjo who suggested to me my family might send reading glasses. Everyone else, including the infirmary, said "Commissary." So I did not know about getting approval to the mail room, until I heard from you. I do hope that works. So far I have been able to keep my mind busy thinking of my lyrics, possible arrangements and instrument parts for my music, ideas for a novel, etc. But all that gets a bit tedious. I could use some reading, light or heavy. I would even be reading this Bible, sitting here unopened for three weeks.

If I asked for a list of what you can send me, they would no doubt give me something I can't read, if they even gave me anything. People are not helpful at all around here.

I have heard about that inmate email you mentioned, but I would not spend any more money than

7/15/2012-5

absolutely necessary with this outfit. I am sure the prison gets a cut of everything we spend on phone calls, commissary, etc etc, even when handled by outside private companies. I only want to spend money with these blood suckers if it furthers my agenda, or prevents me from being dependent on other inmates. I'm not yet sure what that will require. I am just glad this will be over, as I expect at least, in January. No-one has yet given me a release date. I was told the counselor calculates and gives that.

You said that JP3 player might get FM. Around here, I would probably not get much. Even low-populated areas usually have several Christian radio stations, and hardly any decent stations. Maybe in Monroe (Twin Rivers Unit and Monroe Reformatory are both there) there could be decent stations.

7/15/2012 - 6

My understanding from some "veterans" in jail was that the counselor would meet with me and set up a program for me that would involve a job of some kind in the prison. I thought that would happen right away, but it hasn't yet.

A couple of guys suggested I might work in the law library to help other inmates do research, and maybe help myself. I think I could enjoy working in the regular library too. As long as I have glasses, an issue that will hopefully be resolved soon.

My expectation is that as a ward of the state, the DOC will be responsible to pay for cataract surgery I will need for my left eye. I can only see colored shapes and light with that eye. I don't know if cataract surgery is done by lasers, but hopefully it is. They could just transport me to a clinic to have it done. I will be pushing to have that done in the next six

7/15/2012-7

months. I would like to be the most expensive six-month inmate they've ever had.

Also, if the grass needs watered, turn the dial in the control box (on the far side of the garage, behind John's Kilm) to "automatic." It will automatically turn on every evening at about 7:00. Or you can hit one button on the left (I believe it says "manual") to turn it on immediately. Don't hold the button down, as it will advance the stations, so that the first one or two don't turn on. Turn the dial back to off to prevent unneeded daily watering.

Also, were you able to get all my property from the PC jail? There were 6-8 numbered manila envelopes, and about 4 unnumbered. And some books, about 5, and clothing.

I love you. It's good to know there is life outside of this whole, besides this bunch here that doesn't seem to care.

Love, Dad

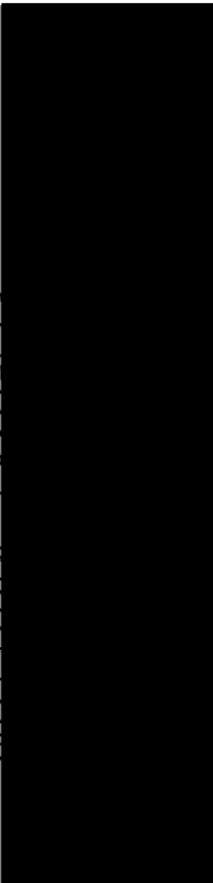
7/15/2012-8

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STEVEN POWELL



MICHAEL POWELL



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JUL 16 2012

July 14, 2012 Saturday

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Dear Michael, (Alina & John too),

I was sooo glad to get your letter last night. Alina arrived at the same time, about 10:00 pm I think. It was about the time of the shift change. I was laying in bed arranging one of my songs in my head, and there was some commotion out on the tier. It was mail! I was able to read both letters fairly easily, although some words I had to figure out from context. Since the lines of the letters are blurred, even though I can read them by their shapes. I am actually writing about as small as I can and still make out what I am writing. A couple of days from now I would have difficulty re-reading this, but I could possibly wade through it.

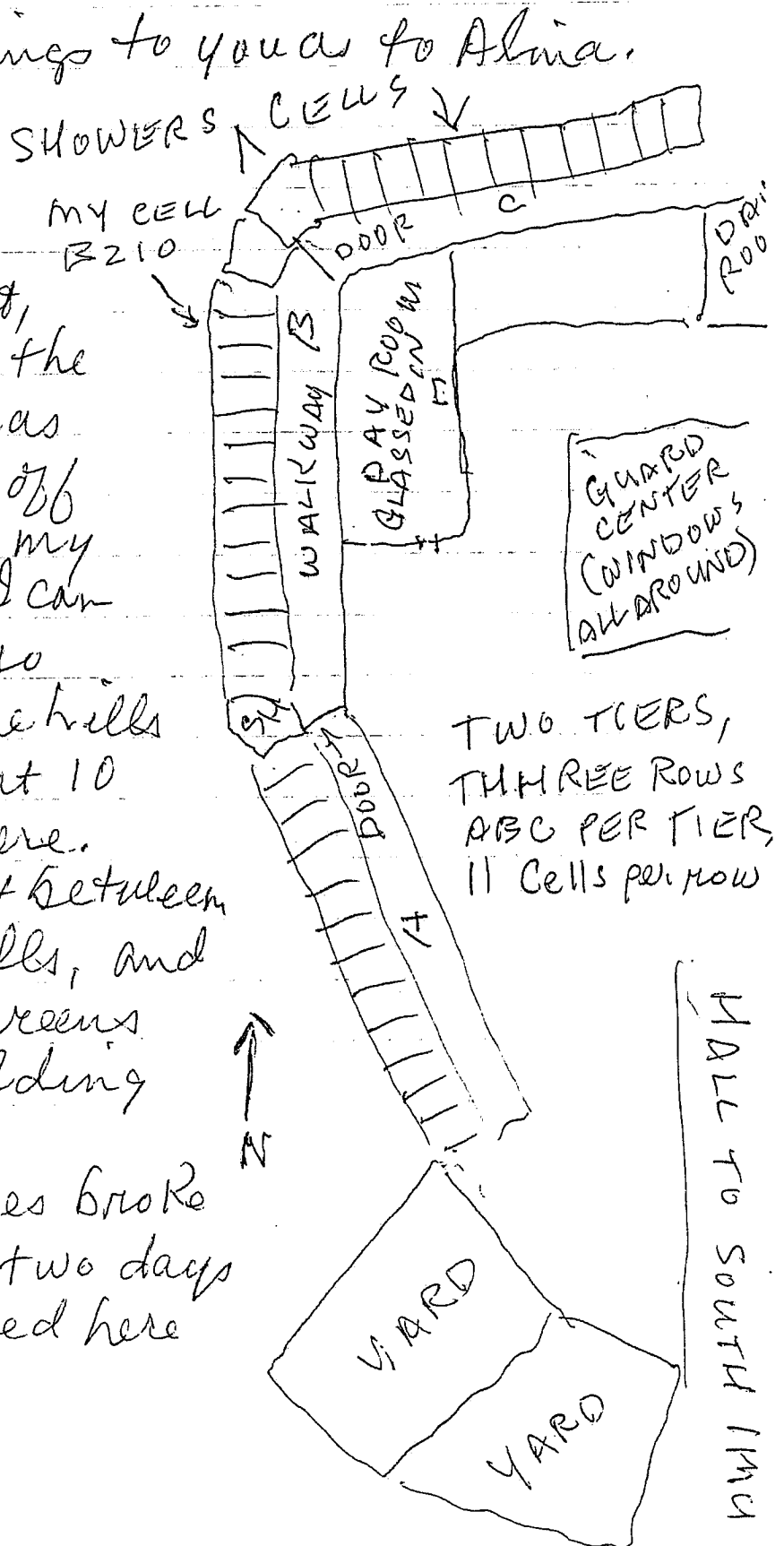
I don't know if Alina is emailing you copies of my letters or not. It sounds like she is at least relaying the information to you. They are sort of stringy on the paper here, so I don't want to write

7/14//2012-1

the same things to you as to Alina.
 I thought I would map
 out this pod.
 My cell faces west,
 and enough of the
 frost coating has
 been scraped off
 the outside of my
 window that I can
 see the Sun go
 down over some hills
 that are about 10
 miles west of here.
 There is a forest between
 here and the hills, and
 I can see evergreens
 above the building
 west of me.

My glasses broke
 on 6/21/2012, two days
 after I arrived here

7/14/2012-2



at the prison. They were confiscated from me on 6/25, so it has been almost 3 weeks since I've read anything. So I will likely be re-reading your letters a few times, since they are the only reading material. I hope I can read the books you and Alina are sending. If the letters are large and clear, I might be able to. The prison library is supposed to stop by the cells once a week. I'm finishing my 4th week and have yet to see anyone handing out books or magazines.

There are some books I want to read, but I will wait and see if they're in the library at my parent institution. If I am placed in "population" I will be free to come and go from my cell and spend time in the library. Here I rarely leave my cell. Showers are supposed to be combined with an hour of ~~the~~ yard or day room on Tues - Thurs - Sat, and yard or

7/14/2012-3

day room is supposed to be available FRI-SUN. So I should be getting 5 hours out per week, without medical visits or other trips to hearings, etc. But I did not leave my cell for one minute Sun July 8 to Thurs July 12. I Showered on July 7 (and shaved in the shower) and my next opportunity to shower was today. Seven days without shaving, and only spit baths in the little sink in my cell. I exercise pretty vigorously every two days, so it felt really good to have a shower today.

If I was not in the hole, confined to my cell 24-hours per day, I would probably be able to find another inmate with reading glasses. I have felt trapped and helpless, being unable to get out and help myself. The faces that come to the window

7/14/2012-4

in my door to serve food and pills are blurred, and I don't know any of the C/Os by name and hardly by face.

The lines on this new batch of paper are darker. That helps. I don't know if Alvin told you, but in the first four days after my glasses were confiscated I wrote over 50 hand-written pages for a novel I would like to write. I have a couple of dozen or so pages of notes for it among the things I wrote in jail too. I hope Alvin has picked up all my jail papers and other property from the jail. I had at least 600 pages of notes, observations and ideas. I never mentioned much of that on the phone. I was afraid the bastards would confiscate it all thinking they might find something incriminating. They would not, but it is fucked up to lose your intellectual property. Some of my notes were "definitions" for the prospective book on defining mor-

7/14/2012 - 5

monism that you and I worked a bit on. I have a couple of dozen pages of notes for that in my jail property. I quit writing so much here because they got stingy with the paper. So I started listing my songs and trying to recall the lyrics. I've been able to recall all of the lyrics for almost 40 songs. I am humming/singing those lyrics to myself, now rotating over the list in about a two-day period, to learn them better. That will help if I perform them. I also re-wrote some lyrics for a couple of songs. Then I started trying to hear orchestra arrangements in my head and work out some harmonies and counterpoints. All of these things I am doing are fairly entertaining, help make the time go faster, and prevent me from going crazy with boredom while I wait to be able to see clearly again.

7/14/2012-6

I now have your address and have memorized it, so I won't lose it again. My DOC # is [REDACTED], and my phone PIN is [REDACTED]. I don't know if both numbers are needed to bill correctly. I'm not sure how it's being billed if you didn't enter either number when you set up the V-connect account. When I dial "1-area code-number," it asks for my PIN, then tells me I have "insufficient funds for this call." When I dial "0-area code-number," you answer, but is it being billed as a debit call to your account, or a more costly collect call?

Most of the guys here in the hole have committed some infraction to get here, like fighting, intimidating, insubordination or maybe worse. There are hundreds of possibilities. But some of us are here because of the high-profile nature of our case. On my row and tier, I am in B210, next

7/14/2012-7

to me in B209 is [REDACTED], who had a huge run-in with a SWAT team in Skagit County, that evidently destroyed his home. This guy's a real rebel, 56 years old, and was slapped with a 12-year sentence. Another guy, [REDACTED] in B204, was accused of killing a female acquaintance and has a 14-year sentence. I heard about him in jail. There are about five other occupied cells in this row of 11, all infractions I believe. I hear gang members hollering at each other from tier to tier (up stairs, down stairs) and trying to be heard through the doors at the ends of rows, and communicating from the shower when it brings them closer to a buddy's cell. There are African Nations guys, spewing their rhetoric on a limited basis, since there are

7/14/2012-8

also black guys, Kosher guys, and others. Today while I was in the shower I heard a conversation among some native Americans who were evidently in fractured together. They were assuring each other they would talk to authorities about nothing.

My name is the subject of some discussions through doors. For the most part I can't follow the conversation. I just hear "Steven Powell" this and that. I feel pretty safe from intrusive or derisive comments here on this row, mainly because B206, a black inmate named [REDACTED] I believe, is not unwilling to take my part when someone gets nasty and stupid, [REDACTED] in B209 is also quiet and respectful.

Sorry this letter is so long. I can't read, but I can write. ☺

That Twilight Zone episode about the last guy in the world breaking

7/14/2012 = 9

his glasses is funny. We'd miss a lot of things if people who make glasses, cars, refrigerators, etc and keep things running were not there for us.

Each yard and day room has a phone.

I'm glad you are focusing on, and staying focused on, your PhD program. Hopefully we'll be able to get our way on the legal stuff. The wrongful-death suit is mostly mine, since it involves deaths of three members of my household due to an illegal and unjustified search. I will focus on that and other matters when I get out. You have your hands full with what's already under way. I have some life-insurance cash reserves we can use to keep attorneys paid (\$15K or \$20K) if it will help.

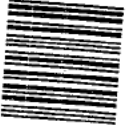
Anyway, I actually look forward to meals here. I'm healthy, safe, and fairly happy, especially after getting letters I can read.

Love, Dad

7/14/2012-10

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only

Steven C Powell



Michael Powell

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JUL 19 2012

HM in Context

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Henry Gustav Molaison is arguably one of the most important figures in the history of neuroscience. He lived from 1926 to 2008, and for most of his life suffered from a severe anterograde amnesia, or inability to form new memories. He developed epilepsy in his teens, experiencing his first grand-mal seizure on his 16th birthday. Over time, Molaison's epileptic condition became so disabling and so intractable that he and his family finally consented to an experimental treatment offered by William Beecher Scoville. The operation was conducted in 1953, when Molaison was 27. The operation was a medial temporal lobectomy, in which parts of the

hippocampus and nearby brain structures were removed bilaterally. Molaison was the first and last non-schizophrenic patient in history to undergo this operation, as his resulting amnesia was immediately clear after the surgery. Postoperatively, he was able to carry out normal conversations and appeared normal to the casual observer, apart from extreme forgetfulness. Among other things, he did not know whether his hair was black or gray. Among the most celebrated aspects of this person were his great willingness to be studied and his desire to help others learn about his condition. Of course, he is mostly widely known by his initials, HM.

The goal of this paper is to give an overview of HM's condition, along with enough historical and conceptual context that the reader should be able to gain an appreciation for why this person was important, what he meant to psychology and neuroscience during his life, and what he continues to tell us about how the brain and mind work. One possible characterization of the function of what is now known as the "medial temporal lobe memory system" will also be discussed.

Overview of HM's Condition

Probably the primary reason HM has been so important to the neuroscientific study of memory is that both his surgical lesions and his cognitive impairment were

very well circumscribed. When Scoville performed the surgery, he removed contiguous areas of HM's medial temporal lobe (MTL), including the uncus, amygdala, and anterior portions of the hippocampal formation (Scoville & Milner 1957). The ablation was very symmetrical bilaterally (Corkin et al 1997), allowing for cleaner attribution of cognitive function to specific brain structures. As for cognitive function, the specific defect resulting from the surgery was a severe anterograde amnesia that was originally characterized as global in the sense that all modalities of memory seemed to be affected: verbal, visual, auditory, olfactory, etc. Nevertheless, this defect did not appear to have brought with

it any intellectual deficits per se. HM still spoke and performed routine tasks normally, and his Verbal, Performance, and Full Scale IQ scores on the Wechsler-Bellevue scale actually rose postoperatively, perhaps due to reduced cognitive interference from epileptic activity (Milner et al 1968). Researchers were therefore able to posit a direct connection between medial temporal lobe structures and the ability to commit information to long-term memory, which was profoundly impaired after HM's operation.

Of course, a major aspect of HM's impact was not just that scientists could point to a correspondence between the MTL and normal memory function, but that

any correspondence even existed – that memory function of the kind impaired in HM could be localized at all. For one thing, while brain areas lesioned in HM were clearly important for formation of long-term memories, they were apparently not the seat of the memory store itself. HM's memory for events antedating his operation was largely spared; he could recall incidents from his school years or jobs that he had held in his late teens and early twenties (Milner et al 1968). This pattern suggests that MTL damage impairs storage of new memories, not retrieval of old memories (Marslen-Wilson & Teuber 1975). Moreover, evidence from other amnesic patients shows a double dissociation between

anterograde and retrograde amnesia: a comparison between patients EP and KC (discussed below) reveals that EP performs better in terms of remote autobiographical recollection, whereas KC performs better acquiring new information (Bayley & Squire 2002). However, this picture is complicated by the fact that MTL lesions often induce a recent retrograde amnesia. HM had memory loss for events in the two years prior to his operation, and objective tests showed some impairment in recall of events that occurred up to 11 years pre-surgery (Corkin 1984, ***). These recall deficits for immediately preoperative time periods are typically attributed to processes of memory consolidation, where memories

are only gradually redistributed to the neocortex and become independent of the medial temporal lobe (Squire 2009).

Another important distinction can be made between long-term and immediate recall. Although he was unable to reproduce information after an extended interval, HM was able to retain conversations and narratives in short-term memory, and had a low-normal digit span. Interestingly, HM's immediate retention was not determined by any fixed period of time; rather, continued retention depended on conditions affecting attention. He could remember a three-digit sequence or other information for as long as 15 minutes through continuous repetition. But when

information could not be rehearsed, as in the case of faces or designs, it faded quickly, becoming irretrievable in less than a minute (Squire 2009). Also, retained information was lost when HM's attention was diverted or when his attention span was exceeded even by a single item (Corkin 1984, Drachman & Arbit 1966). Though dissociable from long-term memory, however, it is doubtful that one would find a brain module in charge of short-term memory. Instead, deficiencies in immediate recall such as those exhibited by patients with Alzheimer's disease and Korsakoff's syndrome hail from more widespread pathologic changes in the brain (Corkin 1984, ***). Thus while long-term memory

encoding is accelerated by MTL structures, there is reason to think that immediate retention may be site-specific. Immediate retention may not even depend on synaptic plasticity, a point which will be explored in more depth below.

Anatomical Considerations

Initially, a correspondence between the hippocampus and memory function was implicated in Scoville and Milner's 1957 report of amnesia in several patients who had undergone medial temporal lobe resections, in most cases to treat schizophrenia. The central thesis of this paper was that the posterior extent of the resection was positively related to the severity of the resulting memory

impairment. Specifically, patients in which only the uncus and amygdala were removed exhibited no persistent memory deficit, whereas patients suffering damage to the hippocampus and hippocampal gyrus had impaired recall; the most grave memory deficits appeared in patients with the most extensive hippocampal lesions, and HM was one such patient.

Work in decades to follow provided a more nuanced picture of the brain areas involved in memory function. Scoville (1957) noted that all of his patients with bilateral hippocampal lesions exhibited considerable memory deficits, while a patient with an extensive unilateral resection in which the right inferior temporal lobe and

hippocampus were removed showed only transient memory impairment. It has since been speculated that other patients with amnesia following unilateral MTL ablations, such as Penfield's patient PB, had preexisting lesions in the opposite hemisphere. Indeed, at autopsy, a histological examination of PB's brain confirmed that, along with surgical ablations of the anterior hippocampus and other MTL structures on the left, there was cell loss in the hippocampus and dentate gyrus due to epilepsy-associated hippocampal sclerosis in the right hemisphere (Corkin et al 1997, Margerison & Corsellis 1966). PB's case among others also bore on the issue of isolating the key

brain structures involved in the amnesic syndrome: while the 1957 report certainly implicated the hippocampus in memory functions, it was not clear whether the uncus and amygdala might also play a role since they were also removed in each of Scoville's MTL resections. But the bilateral component of PB's lesions was limited to the hippocampus and dentate gyrus.

The hippocampal formation consists of the hippocampus, dentate gyrus, subicular complex, and entorhinal cortex. The entorhinal cortex receives about 60% of its input from the perirhinal and parahippocampal cortices, which in turn receive input from sensory cortex. The entorhinal cortex sends projections to the

intraventricular aspect of the hippocampal formation, consisting of the hippocampus, dentate gyrus, and subicular complex.

Primate studies have indicated that all of these connected structures – but not the amygdala – are implicated in recognition memory (Corkin et al 1997, ***). Damage to the mammillary bodies, which receive strong projections from the hippocampus, has also been connected with Korsakoff-type amnesia (Scoville & Milner 1957, ***).

Questions then arise as to how these various structures contribute to memory function. There is some support for the idea that damage to each of these structures impairs memory function by degree. That is, bilateral damage confined to the

hippocampus and dentate gyrus, as in PB, does result in considerable memory impairment but not as severe as that seen in HM, whose lesions included anterior portions of the parahippocampal gyrus as well. Lesions extending to more posterior parts of the parahippocampal cortex produce an even more profound amnesic condition than HM's, as observed in patient EP (Squire 2009). Another possibility is that the various structures in the MTL have different functions, and that the more structures are damaged, the fewer strategies are available for conducting a task. For example, it may be that the hippocampus is responsible for conscious recollection of episodes whereas the

perirhinal cortex handles familiarity judgments absent of episodic context (Corkin 2002, Brown & Aggleton 2001).

Connectivity is no doubt also an important factor in ascribing function to these various brain areas. Since the parahippocampal and perirhinal cortices, the entorhinal cortex, the intraventricular hippocampal formation, and the mammillary bodies are to some extent organized in a sort of feed-forward chain, it makes sense to think that disruption at different points on that chain could result in similar functional defects. For example, despite that the posterior 2 cm (approximately 50%) of HM's hippocampus was spared, it was atrophic and was most

likely deafferented and therefore nonfunctional due to the total ablation of his entorhinal cortex (O'Kane et al 2004, Corkin et al 1997). Interestingly, cortical connections to the hippocampus appear to be more central to normal memory function than subcortical ones. Interruption of the descending fibers from the hippocampus by sectioning the fornix bilaterally produces at most a transient memory deficit (Scoville & Milner 1957). Conversely, although the fornix and mammillary bodies were spared in HM, these were not sufficient to maintain normal memory function (Corkin et al 1997).

Early Progress of our Understanding of Anterograde Amnesia

HM's mnemonic pathology was originally thought to encompass all aspects of long-term memory encoding, but an important challenge to this notion came with Milner's (1962) discovery that HM exhibited normal learning of a perceptual-motor task, that of mirror-tracing. HM traced a star pattern reflected in a mirror, a task which "requires subjects to inhibit and reverse powerful associations between vision and motor control of hand and arm movements" (Gabrieli et al 1993). HM showed improvement on this task over a period of three days, and normal retention over time. In time it became clear that

amnesics could improve their performance on a range of motor tasks, such as rotary pursuit, in which subjects are required to keep a stylus in contact with a target on a spinning disc (Corkin 1968). In the early years following these discoveries, motor learning was regarded as an exception to the global nature of MTL-associated amnesia.

An interesting point about this motor learning was that HM gained these skills without an awareness of any previous exposure to the task, a phenomenon referred to as source amnesia (Schacter et al 1984, Shimamura & Squire 1987). Amnesic subjects had no conscious recollection of the events in which they had

learned the skills. This was a rather intriguing dissociation, and HM's amnesic syndrome presented an opportunity to examine the boundaries of apparently different memory functions. Over time there amassed a significant amount of anecdotal evidence for other forms of mnemonic sparing in amnesic patients. For example, in 1966 HM was able to draw the floor plan of a house that he had moved to postmorbidity and lived in for eight years (Corkin 2002). On different occasions he has also shown limited awareness of certain public events, such as the fact that Kennedy had been assassinated (O'Kane et al 2004).

With additional information about impaired versus spared memory in

anterograde amnesia came new categorical distinctions among classes of memory. One influential proposal by Tulving (1972) made a distinction between episodic and semantic memory. Episodic memory records personal and autobiographical events, whereas semantic memory deals with general facts or ideas. While there is considerable overlap between the two memory types, they can be contrasted by their content and organization. Episodic memories detail the perceptible properties of the events they represent, whereas semantic memories operate on a more abstract basis; perceptible attributes of events are only important to semantic memory in that they allow identification of

semantic symbols or referents within the knowledge store. Also, since episodic memory records an ongoing sequence of physical events, its contents are organized in temporo-spatial relation to one another, whereas semantic memories are presumably organized in a more flexible, multidimensional system of relationships.

Although some researchers have pointed to a lack of evidence for the dissociability of episodic and semantic memory (Gabrieli et al 1988), it is important to note that Tulving presented these categories as “orienting attitudes” or “pre-theoretic positions” akin to, say, the distinction between sensory and perceptual processes. No one challenges the idea that

sensation and perception are two tightly intertwined domains, but “nevertheless, it frequently makes good sense to talk about laws and principles governing one set of phenomena independently of those applicable to the other.” In other words, the episodic-semantic distinction may provide a descriptively useful set of labels without a demonstration of its psychological reality per se. Albeit on a severely impaired basis, HM and other amnesics have shown significant learning of semantic-type information, both in laboratory teaching experiments and upon examination of postmorbidity accumulated knowledge such as names of famous individuals (Gabrieli et al 1988, Hayman & Macdonald 1993, Bayley

& Squire 2002, O’Kane et al 2004). Even in the face of these small semantic achievements, one is still struck by the profundity of the episodic deficit that results from MTL damage. One study indicates that children with bilateral hippocampal pathology can undergo apparently normal language development and can accumulate in their knowledge store an impressive array of facts about word meanings, famous people, and other cultures in spite of episodic losses “so disabling that none of the patients can be left alone, much less lead lives commensurate with their age, circumstances, and aspirations” (Vargha-Khadem et al 1997).

Another landmark development in the evolving categorization of memory functions was a reevaluation of motor and certain other types of skill learning. Cohen & Squire (1980) proposed a distinction between declarative and procedural forms of knowledge after conducting an experiment involving mirror-reading. Amnesic subjects' learning was comparable to that of normal controls on a task condition where subjects read novel (non-repeated) triads of words backwards in a mirror, whereas on a task condition in which word triads were repeated, normal controls showed greater improvement than amnesics. This showed that while amnesic subjects could engage in reverse remapping

of the letters or writing, they could not remember specific words already seen as well as the controls did. Since mirror-reading minimizes perceptual-motor involvement, it was cited along with several other skills such as numerical rule learning or eye-blink conditioning as examples of non-motor tasks governed by rules or procedures that were learnable by amnesics. Thus a procedural category of knowledge that encompassed both motor and non-motor skills seemed necessary, to be contrasted with declarative or data-based knowledge.

Modality or Something Else?

The declarative-procedural dichotomy in particular raises questions about whether

the modality of the information or something else constitutes the dividing line between spared and impaired memory in anterograde amnesia. Although declarative knowledge will often coincide with episodic, semantic, auditory or visual modalities while procedural knowledge will often coincide with motor or perceptual skills, there are striking counterexamples that show that modality is not the fundamental difference between the two categories. Patient EP suffers from an even more extreme anterograde amnesia than HM after contracting viral encephalitis (Stefanacci et al 2000), but was able to learn enough information to produce the third word in a word triad (for example,

“TRAIN frightened KANGAROO”) when prompted with the first two in an experiment by Bayley & Squire (2002).

What is interesting about EP's accomplishment is that the semantic knowledge gained appeared to be non-declarative in nature, despite that semantic memory would ostensibly fit squarely in the declarative category. There are several ways in which EP's knowledge of the word triads indicates non-declarative patterning. First, the knowledge was engrained through massive repetition: he was exposed to 48 training trials over a period of 12 weeks. More importantly, EP's recall and use of the knowledge differed from that of controls. Despite that after studying the material he

was able to complete triads in a free recall condition with 18.8% accuracy, he expressed no awareness of whether he was giving the right answer, and assigned the same confidence ratings to right answers as to wrong answers. Similarly, when tested on the material in a binary forced-choice condition, EP's percentage of correct answers was measurably above chance. But unlike normal controls, who on average give correct responses more quickly than incorrect ones, EP's response times for right and wrong answers were identical. These points suggest that EP lacked conscious control over the knowledge, a property inconsistent with canonically declarative memory. Beyond that, EP's learned

responses did not generalize like one would expect of declarative knowledge. After learning a triad such as "VENOM caused FEVER", subjects were tested on the trained triad ("VENOM caused ???") as well as a synonym-swapped triad ("VENOM induced ???"). Normal controls' performance on the synonym test diminished only slightly in comparison with the standard test, whereas EP's performance was devastated when synonyms were introduced. The massive repetition needed for learning, the lack of conscious access to the memory, and the rigidity of the knowledge were interpreted as evidence that the information, though

semantic in nature, was acquired by non-declarative means.

Indeed, even within a modality, changes in how the information is presented can have an effect on whether an amnesic subject can learn the material. One study showing this involved patient KC, who developed anterograde and retrograde amnesia after a motorcycle accident (Hayman & Macdonald 1993). The stimulus used in this experiment consisted of creative definitions for 96 familiar target words: “an underpaid textile worker – SILKWORM”. Aside from repetition, a major factor affecting KC’s successful memorization was interference. Subjects exhibit “negative transfer” when, after

having acquired an A-B association, an attempt is made to train an A-C association (Martin 1971). An important point of this study was to compare an error-free learning condition in which subjects simply studied the definition-word associations with an error-prone condition where subjects saw a definition, ventured a guess as to the associated word, and only then were shown the word along with the definition. The errors elicited by the second condition would presumably thwart the learning effort by introducing competing associations. The experiment showed that both pre-experimental interference in the form of pre-existing cue associations and intra-experimental interference in the form

of error-prone learning methods additively attenuated performance. The difference was considerable, with a retention rate of 29% in the presence of both sources of interference, and 84% in the presence of neither.

The authors argued the point that most past studies had used error-prone methods to teach semantic material, which had probably sabotaged retention. For example, the widely cited results of a study conducted by Gabrieli et al (1988) may not be a decisive indicator of amnesics' inability to learn new semantic information because on every set of trials, subjects were shown a word along with the definitions of all eight words in the set, and had to choose from

among them until all the definitions were eliminated. This method encourages a large number of errors (Hayman & Macdonald 1993), which probably have the effect of throwing erroneous associations in the way of correct ones. This consideration has carried with it the suggestion that amnesics' past failures to acquire new semantic information might have less to do with the modality per se and more to do with chronic characteristics of how the information is presented or organized. As a contrasting example, motor skills are typically trained through massive repetition of a sequence of actions, and not through repeated presentation of a choice among different potential actions.

Toward a Deeper Understanding

Study of HM and of other patients with medial temporal lobe damage has shed a great deal of light on how memory functions are organized in the brain. But ideally, we would like to gain knowledge about what exactly is going on in the hippocampus or nearby structures that makes them so important to the formation of long-term memories.

One general notion is that since most types of information seem to be learnable in spite of MTL damage when one resorts to massive repetition, perhaps MTL structures somehow simulate or operate in lieu of repetition. For example, it could be that the hippocampus acts as a temporary

information buffer that quickly stores memories and then replays them over time so as to train the representation in neocortex. In support of this, there is evidence that hippocampal representations replay during sleep states (Redish 2001, ***). Alternatively, it could be that the hippocampus is responsible for the disinhibition of neocortical nodes active in a representation, which should allow for long-term potentiation (LTP) processes to occur very quickly, whereas LTP would be stymied in a normal, inhibited state (MacKay et al 2007). Both of these ideas are essentially degree-oriented; the role posited for the hippocampus is related to

the speed or magnitude of information retention.

But a problem still left over after these explanations have been invoked is that the information stored with the benefit of MTL structures often seems to possess a different character than that stored through brute engrainment. Again, among the more striking examples of this was patient EP's lack of conscious access to trained semantic sequences, and the rigidity of the information. HM has shown similar rigidity in regard to newly acquired memories.

When tested on his ability to memorize a path through a grid-like maze, he was able to succeed only when the maze was small enough that the potential wrong turns in

the sequence did not exceed his immediate attention span. Through repetition, he was able to learn a path in a small, truncated version of a larger maze. But when faced again with the larger maze, he was not able to retain any portion of the path through it, even though the larger path incorporated the smaller path HM had already memorized (Milner et al 1968). Similarly, HM often showed patchy recall of postmorbidity acquired semantic knowledge. He sometimes recalled Kennedy as having been assassinated, and at other times reported that Kennedy was still alive (O'Kane et al 2004).

It is difficult to attribute these issues to on-line performance defects. These patients

can reason about the material in apparently normal ways. During training, EP frequently commented on the stimuli: “when presented with the sentence ‘TRAIN frightened KANGAROO,’ he regularly commented that he had visited Australia during his time in the Merchant Marines and that this kind of incident could indeed occur” (Bayley & Squire 2002). The defect, then, apparently relates to how the information is represented in memory. Especially when one considers that different cues seem to elicit recall of different details in amnesics, it becomes plausible to think that MTL structures could play a role in organizing memories in the brain, beyond just accelerating storage.

The necessary perspective on this issue could come from a surprising source. Although this paper has been entirely concerned so far with the role of MTL structures in amnesia, a debate has been raging for several decades about whether the hippocampus is involved in memory or spatial mapping (Eichenbaum 2000, Redish 2001). The “cognitive map” perspective was sparked by the discovery of place cells in 1971 (O’Keefe & Dostrovsky). In its simplest conception, a place cell is a neuron that fires every time an animal – typically a rat – goes near a particular place within an environment.

Two important ideas about place cells could make them relevant to the current

discussion. First, place cells are not place cells, or at least not exclusively. A growing body of research is uncovering properties of place cells that are inconsistent with a Cartesian-style representation of space. For one thing, the places coded by place cells are not uniformly distributed within a space, as one would expect of spatial mapping, but instead congregate near salient cues within the environment. Also, place cells are not necessarily connected in a coherent topology that mirrors the space itself; instead, different place cells within a population appear to be tied to specific features of the environment. For example, in a double rotation task, where proximal cues in the environment are rotated 90

degrees one way, and distal cues are rotated 90 degrees the other way, different cells in a population will maintain their place-coding in relation to different sets of cues, such that two cells that coded the same place originally will code two different places after rotation (Shapiro & Eichenbaum 1999). Moreover, it has been found that place cells do not necessarily code places in the environment reliably, but rather what seem to be places within a larger task framework. In spontaneous alternation tasks, rats run a W-shaped maze and are trained to alternate left turns and right turns upon reaching the end of the center track. In these experiments, a majority of cells coding places on the center

track do so only for left turns or only for right, but not both (Eichenbaum 2000, Wood et al 2000). This pattern is more consistent with the repeating temporo-spatial topology consequent to task design than it is with the physical space itself.

Beyond this, hippocampal cells respond to a much greater range of stimuli than just places, including olfactory stimuli and even reward valence of odors (Wood et al 2000). Considerations like these have prompted some researchers to view hippocampal cells as coding a “memory space” or episodic mapping domain and not just a spatial map (Eichenbaum 2000, Wood et al 1999).

Second, place cells are interesting both in their remapping properties and in their

apparent functioning as a sort of world model or spatial map. When a rat is introduced to new environment, cells within its hippocampus begin to code specific places. These places are “stable” in that when the rat returns to that environment after a period of absence, each cell codes the same place as it did before. However, when LTP is prevented by blocking NMDA, place fields do not remain stable – but they do form. The key is that if NMDA antagonists are applied and the rat is then placed in a new environment A, hippocampal cells will code place fields; when put in an intervening environment B and then re-introduced to environment A, cells code different place fields than the

ones they used to. This “forgetting” can occur during an intervening hiatus of as little as five minutes. But importantly, cells that already code places in an environment before NMDA-antagonistic treatment continue to code those same places when the rat is again placed in that environment (Shapiro & Eichenbaum 1999, ***). This shows that synaptic plasticity is needed for hippocampal cells to form stable place fields, but is not needed simply for the formation of place fields, or for the activation of existing, stable place fields.

Rats’ performance on the radial maze shows what appear to be the effects of these hippocampal representations. Radial mazes are circular tracks with arms

extending distally in different directions. Efficient retrieval of food rewards from the arms of the maze requires a mental representation of which arms have already been visited. Interestingly, after rats are allowed to learn the task and familiarize themselves with the radial maze, knocking out their NMDA has no effect on their subsequent ability to effectively navigate the maze, despite that working memory is required. However, if NMDA is knocked out prior to learning the radial maze environment, the rats' performance is drastically impaired compared with that of normal controls (Shapiro & Eichenbaum 1999, Shapiro and O'Connor 1991). The suggestion here is that synaptic plasticity is

required to build a representation of the space, but not to use working memory given an adequate representation.

Additional support for this idea comes from the finding that hippocampal lesions impair performance on the radial maze when rats are required to build a spatial representation of the environment and remember which arms consistently contain food (the PLACE task), but the same lesions do not impair performance when placement of rewards was randomized among the arms on each trial but marked by textured floor inserts (the CUE task).

These two tasks appeared to be of comparable difficulty for unlesioned rats; after lesions, rats regained criterion in the

CUE task but not the PLACE task (Nadel & MacDonald 1980). This implicates the hippocampus in formation of spatial representations, and is further reinforced by a more recent finding that hippocampal cells appear to function as a cognitive map for “model-based” decision-making, whereas the dorsal striatum and ventral striatum appear to code “model-free” situation-action representations and action-outcome representations, respectively (Van der Meer et al 2010).

A Possible Synthesis

Taken together, these two important ideas about hippocampal cells suggest tantalizing correspondences with human learning as observed in anterograde

amnesia. In the spatial domain, it looks like hippocampal cells form structured representations of the environment quickly, that these structured representations become stable on the basis of synaptic plasticity, and that working-memory use of these representations does not appear to depend on synaptic plasticity. Additionally, the fact that hippocampal cells encode a great deal more than just spatial layouts – possibly providing a sort of integrated episodic memory map – creates the possibility that the phenomena observed in the spatial domain may extend to a much wider range of domains, especially in humans, who presumably engage in a much

more sophisticated array of tasks and behaviors than rats do.

Phenomena observed in rat studies, then, resemble those observed in MTL-associated amnesia. Specifically, the fact that working memory used in a radial maze task functions in the absence of synaptic plasticity suggests that immediate memory in amnesics may do the same, and would provide an explanation as to why the information is lost when attention is diverted. A new activation pattern replaces the old one, and the old one can only be recalled if there exists a record of it in the form of connection weights. If the hippocampus or other MTL structures are important for rapid formation of structured

representations of the environment or events, it becomes understandable why episodic memory in particular would suffer such a devastating impact when MTL structures are destroyed. The arbitrary events and stimuli constituting episodic experiences would either fail to be recorded or would be recorded piecemeal, rendering them worthless when it comes to reconstructing an episode later.

This explanation would also shed some light on the declarative-procedural distinction and the rigidity of information learned by amnesics. A failure to form structured representations could cause problems encoding associations in general, which could make it very difficult to

integrate information such that it would be dynamically accessible in the way declarative information is. A loss of the system of relationships in which a piece of factual knowledge embeds could essentially deprive one of the cues or conceptual pathways needed to retrieve that knowledge. Meanwhile, massive repetition could be used to train associations which would essentially exist in isolation, disallowing retrieval of the memories through the broader system of declarative associations most people are accustomed to.

But invoking this kind of an explanation raises one question. Aside from memory deficits, failure to form the kinds of

representations suggested above should result in on-line performance deficits similar to the rats' inability to efficiently navigate an unfamiliar radial maze. Yet a large amount of the literature on HM shows intact ability to perform a very wide range of tasks. Beyond normal IQ and digit span, HM was reported to understand jokes and puns, and a recent battery of linguistic evaluations showed normal performance compared to that of controls on such tasks as spelling, picture naming, past tense and plural production, and syntax or thematic role comprehension (Kensinger et al 2001). Similarly, even in the visual-spatial domain, HM was quickly able to detect anomalous features of cartoon drawings, and

performed normally on tachistoscopic tests of letter recognition and letter masking (Milner 1968). HM also showed strong performance on the Mooney face perception task, in which subjects are required to give the gender and approximate age of a person whose face is shown as a somewhat abstract set of black and white contours (Milner 1968, Mooney 1956). In initial trials of an incomplete pictures task (Gollin 1960), HM's performance was comparable to that of controls, indicating that his perceptual abilities were intact in this regard (Milner 1968). On a general anecdotal level, HM impressed those he interacted with as being

cognitively intact, aside from extreme forgetfulness.

But it should be noted that the tasks listed above are ones in which it is plausible that successful performance would depend on chunked representations or highly over-trained rules or procedures. The constellation of tasks on which HM showed impaired performance appear to be ones that require dynamic integration of multiple elements, rules, or references frames. HM showed deficient performance when copying the Rey-Osterrieth figure or when attempting to navigate from one room to another using the floor plan of a building (Corkin 1984). He was also impaired on a hidden-figures task in which “particular

geometric patterns have to be discovered and traced out within a network of embedding and overlapping lines” (Milner 1968). Chances are it would be difficult to rely on chunked patterns for these types of tasks, where shapes have to be coordinated with one another or allocentric-egocentric transformations must be computed.

In a linguistic domain as well, HM showed performance deficits detecting ungrammatical sentences where grammatical errors could only be identified by evaluating several words in a sentence (it was not enough to recognize that one word was problematic). An example would be, “John gave me the car that he couldn’t drive by ourselves,” in which detecting the

error requires an evaluation of whether pronouns agree. In contrast with these subtler combinatorial problems, HM made no errors identifying scrambled sentences as ungrammatical: "Has house she decided to a buy." HM's solid performance on these more blatantly problematic sentences showed that he understood the task and was following the instructions. A number of other deficits were shown in the same set of experiments, all involving sentences where HM encountered some novel usage, ambiguity, or combination of elements (Mackay et al 2007). This again underscores that integration of multiple elements, frames, or rules appears to cause problems to surface in HM's ability to negotiate the

task. Consistent with this idea are the observations that HM uses an inordinately large quantity of clichés or stock phrases in his speech (MacKay et al 2007), and that, “when asked to repeat an unrelated word string exceeding his normal span, will produce large numbers of ‘recombination’ errors; for example, he will substitute the response ‘waste’ for the list words ‘wake’ and ‘taste’” (Marslen-Wilson & Teuber 1975). These points seem to suggest a reliance on chunked or over-trained patterns in the absence of an ability to successfully organize multiple elements or combinatorial information.

It appears that the constellations of tasks on which HM’s on-line performance

was either impaired or spared can be pointed to as reinforcement for the idea that medial temporal lobe damage results in an impaired ability to build and maintain structured representations relying on the association or integration of multiple chunks or elements. Lacking such an ability, individuals have difficulty negotiating novel situations where coordination of multiple combinatorial elements or reference frames is needed. Moreover, a failure to construct representational frameworks leaves learned factual and experiential knowledge isolated and often irretrievable, and has an especially grave impact on episodic memory. These representational frameworks most likely depend on quickly emerging tuning

properties in hippocampal or other cells, and their stability over time – mediated by synaptic plasticity – probably corresponds to long-term memory. Importantly, this view goes beyond a hypothesis that the hippocampus increases the speed or magnitude of memory encoding, instead positing a role for MTL structures in the structured organization of memory, with implications for declarative knowledge.

Final Thoughts

HM's contribution continues to be important as we investigate the role and function of the medial temporal lobe memory system. Our knowledge of his condition transformed throughout his lifetime and continues to transform as time

goes on. The line of research and questions posed by HM's amnesia now runs parallel with other investigations into hippocampal or medial temporal lobe function related to spatial mapping. As these two major lines of research inform one another, it may be possible to ascribe a parsimonious functional account to the brain structures involved. This paper outlined one possibility for such an account. Something that remains clear, whatever the case, is that HM's contribution to science will continue to be a very central one in the coming decades.

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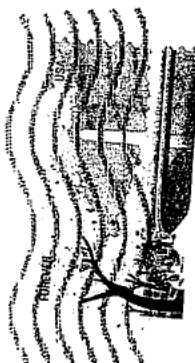
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Dear Mr. Powell,

Along with my co-author [REDACTED] I'm writing a book about your son Josh and his wife Susan, to be published by St. Martin's. As you know, there are a couple of other books in the works, including your daughter Jennifer's and one by [REDACTED]. We believe ours will be the most fair and the least biased (it will not be told from the view point of any one person, including the Coxes). As I've written or said to Alina, [REDACTED] and others, I don't want to demonize Josh; I want to get to know him.

I am hoping that I can meet with you. I'd be willing to provide questions in advance. If not in person, would you speak with me on the phone?

I'm still hoping to interview Alina. [REDACTED] has spoken to her on my behalf, and I have called and written her but have not reached her. Maybe after I meet with you she will be more willing to talk with me.

Would you write me and let me know if I may come see you?

Thank you.

Sincerely,

[REDACTED]