NYU

Denis Pelli <dp3@nyu.edu>

RE: Spending Funds on developing collaboration?

1 message

Waugh, Sarah <Sarah.Waugh@anglia.ac.uk> Wed, Jun 10, 2015 at 5:06 AM
To: "denis.pelli@nyu.edu" <denis.pelli@nyu.edu>

Hi Denis,

Apologies – crowding is still happening up until around 12 (contour interaction looks different) – even our (Sarah L) own data say this, even for single target optotype in closer Cambridge Crowding arrangement – not linear optotypes as usually used in clinic (Atkinson found for standard Cambridge Crowded arrangement 0.5 sep, crowding adult-like gone by 5-7 years of age if I remember correctly). Also when I measured my 2 sons EMs on EyeLink a few years ago (before various moves and computer changes that mean I have lost protocols for testing and need developing again), one was 12 and the other 16 yrs, I remember a noticeable difference in how accurately and smoothly they could follow a target (another reason triggering interest). Would be nice however to measure <8 yrs where even bigger changes are likely to occur. Not sure if learning to read is coincident or causative in improving EM control but they do happen together

Trying to keep data collection to minimum for child and numbers of children required. We have a pre-school on campus and a school next door. Clinic manager has contacts with school. Need to convince myself of need to do this and if I can, then I will do.

One idea 1: measure VA for isolated optotype, then surrounding bars and optotypes in CC arrangement at 1 gap width (edge to edge!), also at 5 gap widths (with these 2 points I think we could estimate magnitude and extent with development which may do different things?). I thinks this looks simply at visual aspects of contouring interaction crowding but doesn't have reading rate included. (Have to consider reading rate on 3-5 yr olds and how to guesstimate.)

Another idea 2: measure VA for isolated optotype, then surrounding optotypes in CC arrangement at 1&5 gap width). Try to combine with reading rate. Have to consider reading rate on 3-5 yr olds and how to guesstimate.

Another idea 3: Problem with 1&2 is that clinically most use linear arrangements of 4-5 optotypes surrounded by box, so then you want to have a separate group do isolated, row of optotypes with fellow optotypes and box at 1 or 5 strokewidths.

It blossoms.

Yes, I also need to re-read literature and be sure of what has been done and what is known. Have Semenov, Atkinson, Jeon and more.

Just talked to Thomson-software-solutions about their eye tracking system, which looks great for clinic. Sales person didn't know details but he is happy to support us as this is new out in May and probably like some feedback, and will do a good deal. Sounds like a video system on a bar mounted on the monitor that child looks at. He will send out details once spoken to appropriate person.

OK – so might consider booking Prague conference and consider Skyping from there if time isn't right here. Can't rely on you staying up so late every night, nor we waking up so early!

Rest of your email made sense on first read but will re-read. For what was planned on amblyopes, Sarah L has done on 78 normals 3-16 years children already. Doesn't include any reading rate or eye movements, but suggests difference between contour interaction and crowding may well be due to this.

Have to focus on something else for today, but nice to touch base.

Best,

Sarah

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From: Denis Pelli [mailto:denis.pelli@nyu.edu]
Sent: 10 June 2015 08:07
To: Waugh, Sarah

Subject: Re: Spending Funds on developing collaboration?

dear sarah

why don't we have a skype session? i'd like to see your data. i'm free most days.

you say nothing's changing in ages 8-13, but Kwon et al. report a huge change in crowding, as i recall, and it corresponds to their growth in reading speed. my hunch is that only fixation accuracy, not crowding, improves in childhood, but i'm not aware of any evidence for that. atkinson and kwon et al. report kids having much more crowding than adults, but i have the impression, without having checked either, that they did not measure eye position.

In Eq. 13 of Song et al. we give a (normal adult) formula for critical spacing S as a function of eccentricity phi:

S = 0.3 (phi+0.45 deg)

Thus, an uncertainty in phi of ±0.25 deg implies that abs(phi) is in the range 0 to 0.25 and that S will be in the range 0.3*0.45 deg to 0.3*0.7 deg, i.e. 0.14 to 0.21 deg. I think that's a tolerable uncertainty, a factor of root two (sqrt(2)=1.4). If their crowding is worse, then I'd expect even higher tolerance to small errors in eye position.

There may be some factor I'm overlooking, but it seems to me that we want a kid-friendly way to measure eye position with an accuracy of ±0.25 deg (or better). I can believe the eyelink will achieve this, and perhaps the new gadget you just read about will work too. Most people want to measure interesting eye movements. All we want to know is where

they are fixating at the time the stimulus is presented, so that our estimate of crowding can take the stimulus eccentricity into account. it's ok if the eccentricity is different on every trial. if the crowding formula has only one degree of freedom phiCrowding

S = 0.3 (phi+ phiCrowding)

then a modest number of trials at random known eccentricities will allow quick estimation of phiCrowding.

i'm planning to visit London in first week of August, but I think you'll be away then.

it'd be good to review data and agree on a summary of what is currently known about development of crowding. my impression is that all the data point to substantial development, but may all be misleading because eye position was never measured. my hunch is the crowding does not change after the first year. however, increasing efficiency of letter identification will spuriously produce an improvement in critical spacing until the criterion is adjusted to look at crowding dissociated from raw ability.

it seems fine to begin with amblyopes, but the basic study that is crying to be done would include normals. do we have a hope for adding young normals?

best

denis

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On Wed, Jun 10, 2015 at 2:03 AM, Waugh, Sarah <Sarah.Waugh@anglia.ac.uk> wrote:

> Hi Denis,
>
> I think it is great to hear from you and not used to working remotely. Nice email! Have been familiar with this Kothe_Regan paper in past and also with repeat letter charts. We had a PhD student use them and vary spacing of letters for crowding - and I think contrast, also maybe foveal and peripheral - can't remember. I need to reread what she found - wasn't the greatest of students and we wanted her to measure even just fixational eye movements on the amblyopes we tested but she never got around to it.
>
> We have an Eyelink and have a postdoc using it. Have a ms soon to submit on microsaccades and task dependence. Head restraint does help and bite-bar even better, but obviously not for kids. (I don't think need such great accuracy with them as guessing their eye movements are much larger and more erratic. The Kwon paper I read only did 8-13 year olds, which is essentially after most things have settled down - crowding, visual acuity, probably eye movements. Which is why we are all interested in earlier years!) My plans were to do crowding experiments with it (and also fixational eye movements as reading letter charts) but absolute accuracy (knowing where eye is pointing relative to target) 0.25 deg not good enough for normal foveal viewing, though relative (change in eye position) is much smaller and probably that is main important thing. I also bought the remote dots to stick on kids foreheads but haven't tried them yet even on adults. Don't have the time to get in the lab and get that one moving, but maybe this is good impetus again. Bought in a postdoc to help this, but turns out he hasn't worked out as I had hoped and rather get a new one involved - but he is computer scientist. Maybe I should give him another go, but not sure you would if you knew. Monika and I wanted him to show us how to use it before he goes, so we can do it ourselves. Perhaps will get him to look at Eye Tribe.
>
> Very kind to offer your Eyelink for project. One plan might be to re-engage postdoc, get ours to work how we want, then if we need another one in clinic where the patients are, it might work best to bring yours over.
>
> Funnily enough, just (last night) saw a cheap eye tracking system that might just work for kids in clinic and was going to call them up. It is only £1945 and not sure how it works as can't find details online, but thinking if I call, might be able to get one to try for free or even keep, as we use their visual acuity charts in clinic already. (Otherwise feel, this should come from main money for clinic, not the fund I am currently trying to spend off.) It is designed for clinicians so should be easy to use - really don't know yet. Won't be as sensitive, but again, not sure this is needed. Couldn't sleep last night very well - up too early and so got up and your email was there.
>
> Also thinking of project comparing contour interaction/crowding that Sarah Lalor has measured in normal kids 3-16 yrs on our amblyopic kids. She presented to L (B/W) stimuli at that reading conference. The plan for her PhD originally was to measure on amblyopic kids, but I hadn't got the kids online yet, so we have measured on about 18? adult amblyopes. This will be faster to get off ground and might be nice to have you involved as by the time I get ethics, sabbatical will be upon me. Also have all of Norsham Ahmad's data that I had hoped to show you and think you would be interested in seeing as it is L, LM and CM contour interaction in periphery (recent PhD but back in Malaysia with 5 children of her own, 2 autistic, so she is busy).

Anyway as I write this, I know there is too much - obviously why I couldn't sleep. This is why I would like to sit and show you - but maybe will try to sit and show Monika. Time together is so hard to achieve these days. Last day with Monika today as she will go on leave and we are working on a Sarah L paper or this is another one that will never see the light of day. Once she is back, I go on leave. C'est la vie.

Anyhow on positive - was just nominated for Award for Excellence in Research Supervision - won't matter if I don't get as the letters the guys wrote make me feel like I won already.

Enjoy your discussions locally. Will see if need to use these funds for eye tracker or just let them slide. Will be in touch.

warmest,

Sarah

From: Denis Pelli [denis.pelli@nyu.edu]
Sent: 09 June 2015 23:45
To: Waugh, Sarah
Subject: Re: Spending Funds on developing collaboration?

dear sarah

thanks.

i'm meeting every other day with najib majaj to write an article about machine learning. it turns out that he is trying to measure development of crowding in monkeys. he's working with lynne kiorpes. i mentioned my plans to do this with you, and we are both convinced that the problems are similar. the bottom line seems to be that if we want to advance the state of the art we must measure eye position.

najib passes on a nice article by David Regan (forwarded separately) looking at development of acuity measured in three ways: Snellen (where the target letter is surrounded by other letters), isolated letter, and repeating letter. He shows that the developmental curve (acuity vs age) is similar for repeating and isolated letter, and that this is much better than Snellen. He is explicitly worried about problems of eye position, which his repeating chart overcomes. i'm not sure if he's aware of crowding (i haven't read it yet), but the repeating letters will also avoid crowding. thus, it's a clever manipulation, but doesn't yield a clear conclusion about what is limiting Snellen performance.

najib feels that the past animal work is hard to interpret because it might all be poor fixation, which improves with age. he feels that Jan Atkinson's central crowding with small kids might also be errors in fixation. so it might be that these groups have no foveal crowding, just bad fixation, and the tests are measuring normal adult-like crowding of peripheral retina.

given this morass, if we're going to add anything, we've got to do better. the obvious way is to measure eye position. najib feels, and i suspect he's right, that any commercial system which does not require head restraint will be ok with kids.

in principle there might be a clever way to measure foveal crowding without measuring eye position, but i'm not sure how. if you were doing a lot of testing with one observer you could use tiny letters only visible in the fovea, but it might be hard to get small kids to pay attention to such weak stimuli.

i'm thinking that if you have free money, what this project needs most is an eye tracker. that would do more than travel. i am not expert, but it's my impression that everyone finds the Tobii systems easiest to set up and use. And they have a new cheap kit, the EyeX.

http://www.tobii.com/en/eye-experience/buy/north-america/

Alas, they only support Windows.

The gold standard is the Eyelink system. It's based on a Windows PC, but you can attach the sensors to your Mac. Sarah Rosen used mine a bit in her phd research and it's now collecting dust. I'd be happy to contribute it for this project. It's not easy to set up, but, obviously, lots of people have succeeded, and i imagine the company support would help. it doesn't require head restraint, but you get higher precision if you do.

for buying a new system, there are lots of sexy things that run only on Windows. One cool thing that seems to run on Mac is the Eye Tribe. I read about it on this blog:

http://www.researchgate.net/post/What_is_the_best_eye_tracking_device_under_400_dollars

http://theeyetribe.com/

https://github.com/esdalmaijer/EyeTribe-Toolbox-for-Matlab

None of these solutions are plug and play. You'll need someone with technical savvy to set it up. Maybe just for a week.

Do you know anyone in Cambridge who's savvy about eye tracking? Copying another lab might be the easiest route. Or is there a master program in computer science with students hungry for work?

What do you think?

best

denis

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On Tue, Jun 9, 2015 at 4:05 PM, Waugh, Sarah <Sarah.Waugh@anglia.ac.uk> wrote:

> Hi Denis,

Hope your Summer project students are successfully underway. I am coming out from under about 20, 9000 word dissertations and 80, 3 hour exam scripts but marks confirmed today.

Want to meet up?

I have limited time to spend around £4K before the end of June and would like to use some of it to facilitate our future collaboration. I am not allowed to carry £ beyond June into next (financial) year, but I am able to spend for approved trips into the future (but it means I have to book and pay for travel/hotel etc. in June, 2015). I am guessing it would cost ~£2K for 1 trip for 3-4 nights. (Assuming they will approve it but who knows?).

1) Would it suit you if I came to New York for 3-4 days to firm up ideas on specific research projects we hope to collaborate on during my sabbatical period? (Would ideally have a couple of hours each day to talk to you about projects, but would otherwise occupy myself if you needed.)

or

2)

C I Could I fund a trip for you over to us? Or, if you are you coming over already could I contribute to bringing you to Cambridge, or me to wherever you are at similar times? (Unfortunately I know they wouldn't let me spend on dinner for you and Horace at Midsummer House!) Would need to know dates etc. so I can pre-book train/accommodation. Funds lost end of June to black hole.

Suggested dates:

22nd-25th June (soon I know)

24th-27th August (Or are you coming over for ECVP then? Could meet you there, or preferably after.)

31st August-3rd September

Any other dates suit you? (excluding 6th July through to 10th August, 2015 as in Australia).

I won't let the collaborative time be wasted and there won't be the many other demands/public appearances that come with being at a conference.

Looking like conference in Prague (CVSoc- will cost about £1K) is a possibility next week (14th to 17th June). It might be way to spend as well as think about securing conference for Cambridge in 2019 (biennial and sorted for 2017), although I would almost prefer to stay still and read! If I go, I will focus on reading for our collaborative project/s at CVSoc – maybe I could Skype you from there, as it is pretty difficult doing this from here.

Perhaps we can discuss then if you are around?

Otherwise I will find something else to spend money on. Maybe I just let it go and read - less stress.

Very best,

Sarah

PS Am also somewhat in midst of Kwon and trying to reflect on this along with own work to see how to incorporate.

PPS I have some separate funding already in sabbatical for trip to NY for me and for you to come to ours. Would be good to finalise these dates too soon, so we can have them in our calendars (in sabbatical application I said I would go to NY in Feb 2016 and you would come to ours in June 2016).

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