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2018 EARLY HEARING DETECTION &

INTERVENTION MEETING

DENVER, COLORADO

TUESDAY, MARCH 20, 2018

AGATE A‑C

DETERMINING THE VALIDITY OF THE VOCAL DEVELOPMENT LANDMARKS INTERVIEW: A PARENT‑REPORT TOOL FOR INFANTS AND TODDLERS

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>>: Is there anyone here needing interpreting services? Okay. Thank you.

So good morning, everyone.

Today I'm going to share with you some work that we have been doing to develop a parent report tool that would allow us to monitor infants' early vocal development in early intervention. And I would first like to acknowledge my coauthors who were not able to be here today. DPR Anne Thomas and Dr. Sophie Ambrose who works with me at Boys Town hospital. I thought it might be beneficial for us to think a moment about why would it beneficial for us in early intervention to monitor early vocal development. So I've got two children to tell you about that. Both of them are ten years of age in these movies, and both of them were early identified through newborn hearing screening, and they both have moderate to severe hearing levels. So let's listen to the first little boy.

(Video clip played ).

And let's listen to the little girl. (Video clip played).

>> MAIN SPEAKER: Nice talking. So in the first example on the little boy in the left, what you heard was simply vowels and pitch variation. The little girl on the right was using true syllables. We call those canonical syllables. So that's quite a different in their early development, and we realized by monitoring vocal development in a systematic way. We may be able to identify infants at risk and honestly the little boy on the left turned out to have apraxia in addition to hearing loss. He stood out as different from his peers and the little girl on the right developed spoken language quite readily. So we believe it can help us identify children at risk, track their progress and there's data to suggest that monitoring these early vocal stages also gives us insights about the children's auditory development. So that's another useful aspect.

So where am I going in this brief talk today? I'll talk to you about what is the VLI, does this tool work. And then thirdly what are our next steps with the tool.

So the reason that we can consider developing a vocal development landmark scale is babies go through very predictable stages of vocal development and by the way, I did upload a detailed handout to ease your note taking that you should be able to get.

Children go through a period that's called expansion by Stacker and it's also precanonical, it's before they produce true syllables. What's an important characteristic of this stage is they don't have very good motor control yet, and so the sounds aren't that speech‑like. So we will hear vowel and vowel like sounds, growling, ingressive and that means speaking on inspiration and high pitch squeals. We might have a marginal babble and that's an attempt to put together a consonant and a vowel that has very slow timing and doesn't sound like a true syllable.

Five to so months of age, babies into a true canonical stage. They get enough motor control that they can make a clear ba,or da or coo. That's an important landmark. Children who are deaf are delayed in that onset of canonical babble, so that's something we watch for.

And then certainly the action really gets going somewhere in this wide range between nine and 18 months, the children get much more complex, not only are they producing repeated syllables but they can put ending sounds on their productions. They might be producing dipthongs and so forth or produce jargon‑like sounds. So all this predictable stages of development allow us to develop a tool to monitor where they stand in regard to the changes we're looking for and that may give us insights about their auditory development.

So there are two other parent report scales of this nature that I want to mention to you if you're not familiar. The first was developed by Keyshon Rabiun in Israel called the price or production infant scale evaluation. And also Robin Cantlemoor in Australia produced a scale called the infant monitor of production.

What I want to show you is one of the examples of an item from the prize and it reads, does your infant reduplicate syllables? For example, when the infant is in the crib playing along with one of the family members, does he produce sounds such as mama ma or baba or B.A. by. And then the parent answers and they use this little Likert scale to comment on how often the baby produces those sounds.

So this is one approach and we believe it has a lot of merit. It's been studied extensively, and yet we wondered, do the parents understand the technical language that we need to use to talk about infant vocalizations. Might there be a way that we can ensure that they're on the same page with us.

I remember a dad who had premature triplets and he was being interviewed by someone in the Omaha area, and those kids were, I think, only three months old, and he commented you should hear them babble. And I thought oh, isn't that interesting. He means babble to be any sound coming out of the baby's mouth. So this isn't so easy. We need a way to standardized across all of our providers how to ask these kinds of questions in a way the parent will understand. So that led us to developing this 18‑item interactive interview that actually we present on PowerPoint slides, and it contains authentic infant vocalizations. So if we want a parent to tell us what is it marginal or was it a true babble, we juxtapose those so they can listen to both of them, and we never have to say, canonical babble.

That was the point. So we want to get on the same page as far as understanding the target. We designed this scale for the of to 21 month old range but, of course, if a child is delayed, you can use it longer than that. And we also wanted to calibrate our examiners who the examiners have told us they've learned a lot from this scale. They weren't necessarily conversant with all the minute infant vocal stages, and this helps them prepare to measure that.

It has three scales, precanonical, meaning presyllable. Canonical which is that syllable production stage, and we have a word stage.

So let me show up you what it looks like. Here's one of the slides from our scale. And what happens on this page, the script to the parent is, these little ones on the top row are making sounds that sound like could cooing or gooing. The children on the bottom row put sounds together but do it rather slowly.

I want you to listen and tell us if your baby sounds more like the top row or the bottom row.

So let me play an example.

(Playing audio )

>>: That's a great example of a marginal syllable. You heard that Mbla. So it's not ba. Not ma. That's marginal syllable. So the parents can play these sound as often as they want. We warn the baby picture are there for interest. It's to make it fun. It's not meant to infer that any particular age.

So we have found that parents really enjoy this interview. They like listening to the baby sounds and thinking about their own baby. So then they see the same slide again, and we say, all right, you told me ‑‑ we ask them, is your baby more like the top row, the bottom row, both equally or not doing each of those things. So they tell us that first. And then let's say they chose the bottom row, we ask them how often are you hearing those. Never, rarely, sometimes or frequently. So that's how it works in terms of the parent response.

October next slide, this is one of the canonical slides and here we are contrasting a true syllable production. (Video playing).

>>: So those sound really different. So again we don't have to use technical language, but on this one we would say to them in the top row, the children are just starting to figure out how to put sounds together but they do so slowly. The children in the bottom row are able to combine them easily and clearly. So their task is to think about is my baby more like the top row, bottom row, both equally or not doing either of these things.

Here is an example from the word scale I kind of like because we know how parents will tell us two word combination which is bye‑bye or all done. Those are not what we're looking for. So on this slide we make that distinction. The babies in the top row are putting thoughts together but they're sort of like those automatic ones whereas on the bottom row, look how they're combining words in new ways without repeating you. Is that what you're hearing? So we'll be contrasting something like.

(Audio clip played).

>>: We have 18 items that look like this that break it down into discreet stages.

>>: So we actually have three different response types throughout the 18 items. The one I already showed you is a frequency rating where the parent using that scale to say how often they're hearing their baby produce these sounds.

We also ask some items that are just inventory. Tell me about some of the ‑‑ once we've introduced consonants and they have heard a lot of them, then we say tell me about the consonants you hear your baby producing. So we keep an inventory.

A third type of item asks them to rate the accuracy of their child's imitation from very far off to really close to their model. So there's three different kinds of scoring for these types of items, and that will become a little bit important as I tell you, does this work.

So we've done a series of studies to start to say, can we validate this tool. One of the ways we made validate is to ask does it capture the developmental stages that we expect. Then we also look to concurrent validity. If we give a different scale like the communication and symbolic behavior scales, speech measure, do those two scores line up? So can we show it agrees with another measure that looks at early speech.

So the children that we enrolled ‑‑ this was ‑‑ we recruited 160 hearing infants just typically developing infants and they ranged in age from six months to 21 months, and you'll see up there that we put 20 of them in each of eight age bins so we could look at the relationship with age over time. We had mostly mothers responding to the scale. You see 155 females. Only five dads. And we have a pretty nice distribution ‑‑ yeah, where were all the dads. We had a pretty nice balance of boys and girls in the study and gender didn't actually play out to be an important variable.

There you see the range in terms of education. So our parents ‑‑ we worked hard to get an average distribution but we have a number of educated parents in the study.

So what did we find? First of all, what you're seeing on this slide in the blue is the precanonical scale and I've plotted their scores in percent of items credited by age. So you're seeing age go across the horizontal axis.

In the blue you see the precanonical scale. So the babies at six months are already darn good. They're getting 80 percent of the precanonical scale which we would expect them to be precanonical but it dozen rise with time. So we are detecting changes at the precanonical level. Middle one is the canonical scale and it's pretty low in the beginning and it just rises steadily over the age span.

The bottom one in black, that's our word scale and it stays low when we'd expect words to be pretty low and then it increases with age. And these three scales differ from one another, but there was a nice interaction in the result showing that it matters what age you're testing.

Did you have a question.

>>: [away from mic]

>>: These are all typically developing infants. We have published a paper in journal of deaf studies on our hard of hearing children, and this scale is sensitive to differences between children who are hard of hearing and children typically developing. But this was a validation effort what do we find out about typical babies.

So there you see at the bottom, yes. Away away.

>> MAIN SPEAKER: Monolingual English speaking.

You don't want to give children at the word level all the precanonical items. Because it's not meaningful and the parents are trying to rely on distant history.

So that's the best correlation that I have ever had in any of my research. It was over .90. That's the correlation between the CSBSDP and our scores on the VDLI. So we know it has concurrent validity.

What have we found. The results showed developmental and concurrent validity. However, if we had an examiner, a researcher listened to he's baby vocalizations would they get the same answer as the parent. So we wanted to do another study to say do exercise and parents agree on the vocal behaviors. That's a harder litmus test, and Anne Thomas, my coauthor did her dissertation work on this. She did a phenomenal job.

So we obtained from 40 of the original 160 babies, we obtained LENA samples, a full day recording. We sent the parents the LENA. They mailed it back to us.

I forget to mention the original interviewers, we just did them on the phone, and sent the parents to a website. So the cool part about the potential of this tool is you can do it remote. They can do it from home. So they just logged on to a website, and we had them on the phone to conduct the interview.

We can also do it face‑to‑face. We've done that many times.

But anyway 40 of these parents and there were five in each of those age bins sent us a LENA recording. As, you know, the LENA gives you a nice printout automated that tells you when the baby is most vocal during the day. So we found the most vocal periods and we spread those throughout the day.

So we captured those vocalizations. We were able to digitize them into clan, child language analysis system, a computerized method, and that allowed us to systematically count the behaviors, transcribe them broadly to look at the inventories and coded them into the categories that the VDLI was looking at.

And we did end up then looking at agreement in two ways. The first way we call ‑‑ this is more complicated term than we needed but bidirectional adjacency. If the parent said frequent and we heard it sometimes we considered ourselves to be in agreement. Why we were using two very different metrics. They're judging their baby based on 24‑7. We were judging on fine, research lab counts. So already those metrics are different so we had to give ourselves a little wiggle room.

And then we also did a second pass where we said presence, absence. Is the parent reporting the behavior at all. Did we see the behavior at all in our 30 minutes. So those are the two ways we looked.

And what you'll notice, we had hoped for 80 percent agreement or better. And you notice on the by directional adjacency, we're almost there. 79.9.

However, look at how high the word agreement was and the other two scales. That's not good enough agreement yet. And so we want to look at that a little further.

On the right you see presence absence, we have very high agreement on the kinds of behaviors the babies are producing. So that satisfied us.

But then we looked at it by response type. Remember I told you there were three different types we had and if we look at the ones where they reported inventory, my child's producing these sounds, or accuracy, pretty close in imitating me, those all had really good agreement no matter how we looked at it.

So we have a whole set of items that worked really well.

However, we go back and look at the frequency, sometimes, always, never, rarely, only four of the 11 items were above chance agreement. And so that suggests to us we might want to rethink that. However, if we look at presence absence we had really good agreement on most of the behaviors. So it may not be worthwhile to throw out the frequency scale because it might guide us in intervention. So we're still thinking about that and refining the tool. What's interesting is something like jargon, you would think that's really identifiable, we think that our definition was two strict and parents couldn't discriminate that from variegated babble. Some people don't even separate those. We might have split a hair too finely so we can refine that.

So something like a raspberry, those are infrequent vocal behaviors and we found there were harder to get agreement on infrequent ones. We may not have had an opportunity to hear them in 30 minutes.

So what we conclude from study 2 is the parents and examiners were very often in agreement on the presence and absence of the set of these behaviors, but the nonfrequency items worked better than our items where they used the Likert scale.

It does suggest though that the VDLI shows promise and we shouldn't throw it away and we should keep working on refining the tool. So where are we going next? We're going to use our findings from study 1 and study 2 to strengthen our scale. We've been developing a very detailed administration manual for examiners. We also plan to conduct an analysis called item response theory. That's going to allow us to put this in an adaptive mode instead of realizing on basals and ceilings. The tool itself will adapt to the responses so that you're getting in the right sweet spot for measuring vocal behaviors. And the coolest part, we have a meeting this week with a programmer, so our hope is not only to have a web based version but an app for parents. We also hope to run a study where we prime parents ahead of time for what behaviors to listen to, and find out if that increases their ability to report on their infant vocal behaviors.

So more to come. We're excited about it. It is something parents enjoy, and I think it makes a lot of sense for us to have a tool where everybody's doing it the same way, and that's what an automated tool might give us. We had done work on infant vocalization in my lab for years which is where we got all those lovely babble samples. Thank you for your interest.

[Applause]

Any questions. Yes.

>>: [away from mic]

>>: You know, yes. We are. And we did have some parents with lower education in our sample. I don't think we had enough variance to be able to detect that contribution, but Kim Oller has a very nice paper showing that parents regardless of socioeconomic status are able to report accurately on babble. I just wrote up this paper for publication and I remember reviewing his papers and being struck with there are several papers that this is one behavior that regardless of SES it's robust enough that parents appear to be able to report it. Now, whether they can report everything on our scale, it's still important to look at because we don't know that they can report on all these behaviors.

Yes.

>>: You reminded me of visiting the eye Doctor. Is it more like this. More like this.

>> MAIN SPEAKER: That's where I got the idea.

>>: I think it's awesome. I like that the parents become more educated about vocal development themselves through this whole process and thirdly, it ‑‑ can I use it in my work with my kids? Is it available and how do I get a hold of it.

>> MAIN SPEAKER: It's not available quite yet, but we are working really hard to make it available as soon as possible. And certainly e‑mail me if you're interested, and I'll talk with Sophie. We may be able to release a practice version.

>>: [away from mic]

>>: Yeah, we've been heartened by the response from parents. They really enjoy it and they do learn from it?

>>: [away from mic]

>> MAIN SPEAKER: The parents or therapist what kind of tool goes back.

>>: We have a scoring sheet so you end up determining sort of what level. Are they at the precanonical, canonical or word level. Are they somewhere in between. So you get somewhat of a developmental range. You can talk to the parents about. And we have given it in our program repeatedly so you're able to get a progress measure.

Yes.

>>: [away from mic]

>>: If you do make it and app adding the parent component as a follow‑up. So if your child is at precanonical on the therapy end, could you share that with the parents and maybe provide information about ways to support that within the app?

>>: That's a lovely idea. I always love giving these talks because we get these pearls of wisdom. Thank you.

>>: You said you were writing it up for publication. Do you know where it will be published.

>> MAIN SPEAKER: We're thinking AJSLP or although Tomblin was encouraging us to consider developmental journals. We might look at an infancy journal. But we're waiting for Anne Thomas to finish up the dissertation part. We're going to publish them as a two‑paper set is the goal.

One more over here? Oh, back there. Sorry.

>>: What kind of setting are you envisioning this being used in? Because I can see it obviously being used by early interventions but possibly by a pediatric in pediatric offices.

>>: Yes, we've done both of those so we have taken it on home visits on a laptop. So I could see it in an early intervention context. We have done it in our clinical program. So I think it has flexibility. From a research standpoint it's nice to call them on the phone. It's the easiest recruiting we've ever done.

>>: [away from mic]

>>: How soon will this be available.

>> MAIN SPEAKER: I know. There's my demise. My retirement in August. We're working on it as rapidly as possible.

Oh, I'm hoping for months because we're meeting with the app developer soon and after I retire, Sophie Ambrose will be the good contact person.

>>: I just have one quick question of your comment about how it could guide intervention and the feedback that you would get as far as what the parent perceived and what was ‑‑ and that difference there would be so great to just be able to target that for intervention and go hey let's listen to this. This is what it sounds. This is our next step and I think that would be a beautiful tool for that.

>>: Thank you. I think so too. When I point out things babies are doing, moms took such heart that I do think we can give them more. It's a long wait for those first words and to be able to give them look at the building blocks that are coming in place, you're going to get to those first words and these building blocks are essential. Let's not discount them.

Well, thank you all. We'll work hard.

[Applause]

>>: Anybody that might like to sign up for Dr. Ambrose study to help recruit families for telehelp to keep hearing aids on, there's a side on in the back.

(End of session.)