FRONT PORCH SERIES
BROADCAST CALLS

Improving Head Start Children's Understanding of Numbers

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QUESTIONS FROM OCTOBER 28, 2013 FRONT PORCH SERIES BROADCAST CALL

Q: If programs are looking to acquire additional board games, what would you say are the features they should be looking for? We've seen Chutes and Ladders and the Great Race as something they could create. What is a good board game to increase numerical learning?

A: The simplest answer is, anything that has numbers is going to be at least somewhat useful. Beyond that, we don't know too much. I strongly suspect—though I don't know for a fact—that games like Monopoly would be useful as well, because you need to deal with money a lot. Children are interested in money and can play the role of "banker" and pay for properties they buy. That would be another good game to play.

Q: So, anything with numbers. We saw the difference around the board games and the video games, but what about number games that are on a computer? Is there something special about the interaction with the adult? Or something about being able to have both the audio/visual, but also being able to physically touch something that's helping the learning? What if programs are thinking about that trade-off between playing board games or playing a number game on a computer?

A: I think that the social interaction that adults and children have—or older children and younger children have—when they play board games is something that often isn't present with the electronic games. I think children learn better and also often are more motivated when they play interactive games. But, on the other hand, the electronic games have an advantage in that you can do them when you're by yourself. There certainly are electronic board games for teaching older children quite a bit about numbers, like Battleship, which is a game very much like the game I showed you except with fractions. It's a board game for somewhat older children, but that's one that I know off hand that's a well-documented game that works well. I think there's nothing in principal that prevents electronic games from working well. The only hesitation I have is that you often don't get a lot of these kinds of sensory modalities involved. I think part of the reason the Great Race works as well as it does, is that the children are saying things; they're physically moving a token and they're doing a variety of things that they see, they hear, they feel what's going on in these numbers becoming larger and larger. I don't know if that mapping is usually as direct with the electronic games. If you can make it direct, then I think those games would be extremely effective also.

Q: Some of our listeners have noted that the average age in one of the experiments was 4.8, but how young could you go? Have you tried the Great Race with three-year-olds?

A: We have and the Great Race works okay with 3-year-olds, who are near their fourth birthday, from middle income backgrounds. But from low income backgrounds, we usually start with children at about 4-years and 4-months, or 4-years and 5-months, because the 3-year-olds and very young 4-year-olds from low income backgrounds often have trouble sitting still to play the game, and they also have so little knowledge of numbers that it would probably take a lot more time to get them to benefit from it. I think the 4-year range is probably the optimal time for children from low income backgrounds, and a little earlier in that year for children from middle income backgrounds.

Q: Another activity you've probably seen if you've spent any time in a pre-school classroom is "calendar." Is calendar something that could also help with numerical magnitudes? Or would you rather see folks spend their time not doing calendar and doing more board games?

A: No, I actually like calendar activities also, because the children do have the opportunity to see the numbers going up steadily. It might be especially good if the children were encouraged to start from 1, at the beginning of the month, and then count up to where they are on that date. So if it's the 17th, they would count from 1 up to 17, rather than just naming it as an isolated stimulus.

Q: In the process of playing the board games, is the adult providing some feedback to children? Is that also part of what's happening here?

A: Well, yes and it's very important that that happens. Actually, after we got these results, our grants officer in Washington was encouraging us to develop an electronic version of the game. And at first I was very excited about the idea. But then the problem with providing appropriate feedback turned out to doom it. This problem may be overcome in the future, but it hasn't been so far. For the game to work, there has to be feedback. If a child is on 5 and spins a 2, and they don't know that 6 comes after 5 and they can't read 6, they're not going to be able to do anything. Left to themselves, they'll just say "1, 2." We've done experiments that show that saying "6, 7" in that context leads to a real lot more learning than saying "1, 2" all the time, which is what children do if you don't push them to say the bigger numbers. And, the electronic game—what I was told was possible but turned out isn't yet—is that you could have a speech understanding program as part of the electronic game, and it could understand what the children said, and could give them appropriate feedback. If the children were a little older—I was told that if they were 6, 7 for sure—the electronic hardware was good enough that they could provide feedback that was based on what the children were saying. So, it could tell if the child had said "6, 7" or "4, 8" or something that was just wrong, or "1, 2" which is right, but not what we're looking for. But with very little children and especially little children from a diverse set of backgrounds, the speech understanding programs that are available today just aren't good enough to provide reliable, accurate feedback.

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