Communicating in colors

Cultured Scene interviewed Thomas Müller about his recently launched phone app.

CS: How does the Color Game app work – how do users play the Color Game, and what is the 'aim of the game' from the user's point of view?

TM: In essence, it is a standard referential communication task – the goal for one of the players, the sender, is to describe a target color (here, the darker shade of blue) to the second player, the receiver. However, players are limited to black-and-white symbols provided by us to do so. These symbols have been chosen to be somewhat ambiguous, so to succeed the players have to establish a common "language" over time. Also, we do not provide specific feedback to players on the receiving end. Overall, it would probably take the receiver some effort and learning to understand the sender's intended color in the example.

The main aim for users thus is simply that: to communicate successfully on both sides of the interaction. For this, they are rewarded with points and can climb the leader board that is public to everyone. Furthermore, points unlock new symbols and game modes, which potentially allow for further progress in the game. An important feature of the game is that players are free to choose who they interact with (see an example of the home screen below), and in which way – "puzzles", as we call the interactions, can be played interactively or sent off asynchronously to anyone they like.

What research questions are you hoping to investigate using the Color Game app?

Generally speaking, we want to study how language evolves: The specific design of the app has been deliberately constructed to test several hypotheses concerning a range of questions in the field of language evolution. These hypotheses have been pre-registered as part of our six projects on the Open Science Framework, which are not public yet, since we want the players to be unaware of our predictions while the game is running. However, without going into detail I can reveal that we will cover various different topics such as pragmatic effects, the formation of meaning and categories, and phylogenetic trees.

Where did the initial idea to use an app to study this come from?

We normally run laboratory experiments on artificial language evolution, so the idea was to possibly overcome some of the limitations that these exhibit. From there, the idea to make it a mobile game seemed rather appealing, a game that anyone could play at home, in the train, on the way to work… We then started to think about how our latest experiment could be translated into a mobile app.

Were there any challenges or delays in developing the app?

Yes, many challenges and a lot of delays. Translating the standard experiments we usually run into a mobile game people would play without payment and for fun proved challenging but doable. Second, we also had to try to combine the scientific side with the specifics and manipulations that were actually doable in the app; and not just once, but for all six pre-registered studies. However, overcoming the technical challenges was hardest; of course, it took a lot more effort, several rounds of testing and fine-tuning to create a project in such a scale, compared to lab studies. Overall we worked on the project for almost two years until the app finally launched.

Why use an app rather than having participants come into the lab? In what ways are you hoping that this approach will improve upon previous studies?
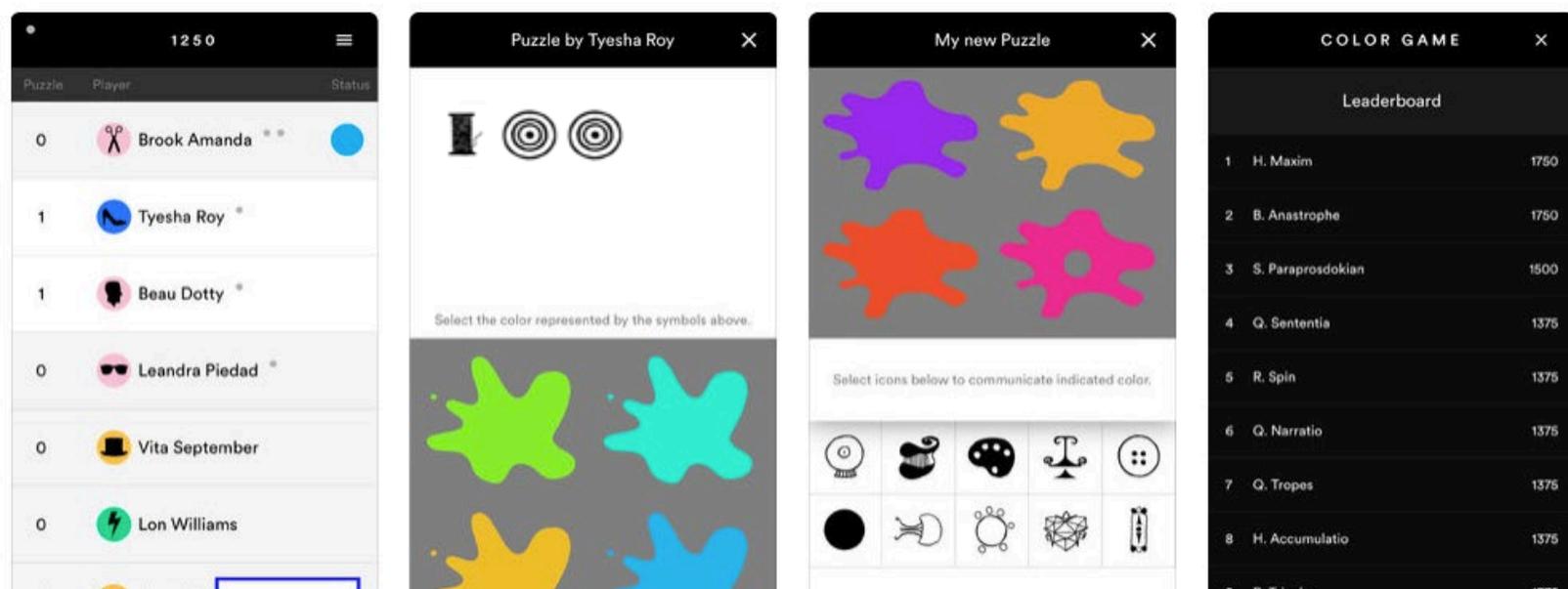
Interface of the Color Game app. Participants are ranked by their achievements. The goal is to identify a color based on a series of symbols, or to describe a color with these symbols.

First, this is of course a matter of scale – a smartphone app can reach a number of players and gather data that would take us years to collect in the laboratory environment. But this is not the only improvement we gain, and for scale alone we could have used a standard online experiment. Through the use of a mobile application that players stay logged into and use repeatedly, we think that more realistic conditions arise regarding real-life linguistic interactions: In our case, players can freely choose the partners they want to interact (and succeed) with from the pool of users, and the direction and amount of transmitted information is completely unguided by us as experimenters. We also discuss these advantages, amongst other things, in the short paper recently published and accompanying the app (Morin et al., 2018).

You have pre-registered hypotheses regarding the results from the Color Game – why was it important to you to pre-register your studies?

The pre-registration clearly marks the related analyses as predictive and shows that the app was developed specifically for the purpose of testing these ideas. In contrast, it prevents us from making big claims about unexpected or accidental results, although we are still able to perform exploratory analyses (as anyone will be once our data is released to the public). Also, pre-registering all six projects in advance meant we had to think all of them through and make sure they do not interfere with one another, which was extremely helpful in

deciding how the app should be designed.

Having reached the point where you have a working app and are using it to collect data, what would your advice be to early career researchers considering this type of approach to data collection?

If the project is supposed to be of similar scale and the app the central means of data collection, then the obvious advice is to start very early and plan for generous amounts of time, since there will be unexpected obstacles on the way. Once the app is working and can go live to the app stores, an important point not to neglect is that the game has to be promoted to actually reach users, because you cannot rely on the usual channels for participant recruitment at this scale. ☐

THE COLOR GAME APP IS AVAILABLE AT HTTPS://COLORGAME.NET/EN/

Morin, O., Winters, J., Müller, T. F., Morisseau, T., Etter, C., & Greenhill, S. J. (2018). What smartphone apps may contribute to language evolution research. Journal of Language Evolution.

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