# “Tactile Graphics with a Voice” - A DIAGRAM webinar presented by Richard Ladner

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## Q & A Summary – February 24, 2015

1. **QUESTION**: **“When creating a braille tactile graphic, what information needs to be included?”**

**ANSWER**: I try to make the tactile graphic as close as possible to original visual image, except for being larger and with textual information in braille or QR codes. Naturally, this tactile graphic may be separate from where the text is found so there has to be a way of indicating where in the book the image is. Hopefully, there are consistent figure numbers already to do this indexing.

1. **QUESTION**: **“Is that** [**Voiceover**](http://www.apple.com/accessibility/osx/voiceover/)**, or is the voice built into the app?”**

**ANSWER**: The app uses VoiceOver when it is not in a mode where it is taking a picture. In the picture taking mode, any verbal feedback is generated by the app itself. For example, the app might say "zero" if no QR codes in the field of view. It might say "focusing" if it is focusing and so on.

1. **QUESTION**: **“Could we get some more information about math OCR programs?”**

**ANSWER**: The program called Infty Reader is the only decent program that I know of that does math OCR. Check the Infty Project page <http://www.inftyproject.org/en/software.html>.

1. **QUESTION:**  **“Have studies of reading comprehension been done for this style of graphics compared to braille labeled graphics?”**

**ANSWER:** We did study this, but not as fully as we could. Please check our paper: Catherine M. Baker, Lauren R. Milne, Jeffrey Scofield, Cynthia L. Bennett, and Richard E. Ladner. 2014. Tactile graphics with a voice: using QR codes to access text in tactile graphics. In Proceedings of the 16th international ACM SIGACCESS conference on Computers & accessibility (ASSETS '14). ACM, New York, NY, USA, 75-82. DOI=10.1145/2661334.2661366 <http://doi.acm.org/10.1145/2661334.2661366>

If someone doesn't know braille like 4 people in the study, then the braille tactile graphics is not as useful as the one with QR codes. I believe that braille readers might prefer the braille tactile graphics, but we don't have enough data to verify that.

1. **QUESTION: “Does accuracy mean finding the correct label or getting the correct information?”**

**ANSWER:** In our study accuracy means getting the right information. In the case of the right triangle a user might give the wrong answer by scanning one of the QR codes on one of the two legs of the right triangle, thinking it was the hypotenuse. The tasks were designed so the users needed to understand the tactile graphic and scan the right QR-code to answer the question about the tactile graphic.

1. **QUESTION: “How do you make the QR codes?”**

**ANSWER:** QR codes are public and free. This distinguishes them from proprietary codes like are used with the digital pens. There are websites that will create the images for free. Just do the search "QR code generator" and several will appear.

1. **QUESTION: “You mentioned at the beginning of the session that there are math OCRs - can you name any one in particular?”**

**ANSWER:** Infty Reader

1. **QUESTION:** **“For the reading comprehension, I would be concerned about cognitive load.”**

**ANSWER:** There is a lot of truth to this comment. A complicated tactile graphic might be very difficult to understand. This is particularly true of almost any tactile graphic of a natural object. Indeed, the more realistic the original image is the more difficult it is to make a comprehensible tactile graphic out of it. However, one of the great things about images from math and science books is that they are often schematics, simplified already to the essence of the information to be conveyed. These kinds of images do well when made into a tactile graphic.

1. **QUESTION:** **“In the triangle example, how did the user know that 24 meant it was a triangle--did they have a key of each QR code?”**

**ANSWER:** Actually, it was a right triangle. The right angle could be detected by a little box there, so in its tactile version the right angle of the can be found fairly easily. The hypotenuse is opposite the right angle, not either of the two lines emanating from the right angle. Each of the three QR codes for the three sides are near the middle of each side. There might be several strategies for finding the right QR code, but they do not require any guessing.

1. **QUESTION:** **“Did you create the QR codes separately from the graphics?”**

**ANSWER:** Yes, we used a web site to create the QR codes, printed them and pasted them on the tactile graphics. A better approach might be to use a printer that does both embossing and ink printing on the same paper. Printers that do this exist but are expensive.

1. **QUESTION: “Would you consider using any supplementary information? For instance, how many QR codes there are in a diagram, so a user knows that they have found all the required information.”**

**ANSWER:** This is an excellent idea. Certainly supplementary information could easily be added and always put in the upper right hand corner of the tactile graphic.

1. **QUESTION:** **“Would this be available for Mac and Windows platforms?”**

**ANSWER:** Our text extraction product, TGA , which is free, is only available for the PC. The talking QR code reader, TGV, is also free and available only for iOS.

1. **QUESTION: “Will you be experimenting with 3D printers in the future?”**

**ANSWER:** I don't plan to work on 3D printing soon, but there are a number of projects around the world that are exploring 3D printing with accessibility applications. But there are people I know who are experimenting with 3D printers with accessibility goals. I saw some work at Virginia Tech about this recently. You can read more about 3D printing for accessible education here: <http://diagramcenter.org/3d-printing.html>.

1. **QUESTION: “Is it possible to scan and read braille dots just like QR codes?”**

**ANSWER:** There is a product called OBR from Neovision that can OCR braille, but I don't believe there is a smartphone version. I believe a smartphone camera-based braille reader would be a nice innovation, but I don't think it will be easy to do.

1. **QUESTION: “Is the software that you used to do the book conversions available for use somewhere?”**

**ANSWER:** Yes. The TGA is available for free from the Tactile Graphics web site: http://tactilegraphics.cs.washington.edu/. To do the entire workflow you also need other standard commercial products such as Photoshop, Illustrator, OCR and braille translation.

1. **QUESTION: “Where did you store the information for the QR codes? E.g. did you have them stored via web on the university's server?”**

**ANSWER:** Tactile graphics with a Voice does not need to store any information because the information is already in the QR codes. You just need the QR code reader to get at the information. The information on the QR codes is simply the text in the original figure. The QR codes are placed in the same location as the text in the figure.

1. **QUESTION: “Other than Adobe Illustrator, do you have any recommendations on programs for merging the graphic, braille, and location files?”**

**ANSWER:** I'm sure there are other programs that could be used, but scripts would have to be developed to do the merging properly. It might be doable in [Inkscape](https://inkscape.org/en/), [GIMP](http://www.gimp.org/) or other similar products.

1. **QUESTION: “What is the name of the iOS app?”**

**ANSWER:** It is not quite available in the iOS app store. We are working to make it available.

1. **QUESTION: “Is there limitation how much information you can put on a QR code?”**

**ANSWER:** QR codes come in different resolutions so there is no simple answer. For a 1-inch square code, you can get about 125 characters at the highest resolution. It would be scanned from 6 inches away. QR codes are designed to be scanned by cameras found on smartphones.

1. **QUESTION: “What is 3D printing doing to literacy?”**

**ANSWER:** Low-cost 3D printing is so new, I don't know what its impact on literacy will be. I will point you to an excellent TEDx talk by Chelsea Cook who did find some use for 3D printing. <http://tedxtalks.ted.com/video/Creating-interfaces-creating-ex>