## Gender / Age / Ethnicity / Nationality / Education / Employment history

HK Thanks very much for agreeing to talk to me. You know a little bit about the project from what I’ve told you and what Andy’s told you, so we’re really interested in people’s encounters with visualisations and what happens at that moment when someone looks at and engages with and explores a visualisation. And so in order to think about that we’re interested in how visualisation, designers and professionals, think about the end user in the process of making the visualisation. So really that cluster of questions about research and users, it gets to the heart of what we’re interested in, but the preliminary stuff is useful as well for contextualising the type of work that you do. So is it okay to go ahead and work through the questions?

VP8 Sure.

HK Do you mind telling me your age?

VP8 I am 37, male, white, German. Education wise, I have a mixed background. First, I did a practical school, it’s called SAE, and I did a Multimedia Producer course there, a one-year course, and I gathered some practical experiences working in agencies. I went then to university in my mid-20s to study Cogitative Science and I acquired a Bachelor’s Degree there, did a Master of Arts in Interface Design, so I went to a design school and got my Master’s, and then also worked as a research assistant for a few years.

HK And then became an independent visualizer after that?

VP8 Exactly, so I’ve been doing freelance work for the last ten years or so, and while I was studying I would do freelance work during my studies just to earn some money, and also during my time as a research assistant I would do part-time self-employed work and part-time work at the university. And I think maybe the last five or six years I’m full-time self-employed as an independent consultant.

## How would you describe what you do today?

HK And how would you describe what you do? I notice that you’ve described yourself as a Truth and Beauty operator.

VP8 Operator, exactly!

HK Do you want to leave it at that or do you want to elaborate?

VP8 Actually that’s the short version, and it’s a good icebreaker because people ask you about it and what it means and so on. I work as a designer so I help people make sense of their data, on the one hand, so quite often I will also work in the beginning of a project, mostly as an analyst and try to identify interesting stories in the data and how people understand what data they actually have and which quality. And then I’ll produce visuals to help them either understand their own datasets better or communicate insights of the data. And often the pieces are interactive or have a strong computational component, but sometimes they’re also fairly handmade or more like a print graphics, that depends, but often I will be booked for interactive visuals.

## What kinds of clients/organisations do you work with? What uses do clients make of the visualisations that you produce?

HK And what kinds of clients do you work with, can you classify them into types, or is it more diverse and varied?

VP8 There’re are a couple of groups of clients, so I work, on the one hand, with large organisations, like The [Client 1] or the [Client 2], and these are organisations that have an intrinsic need to put data out there, be it in the form of raw data so people can make use out of it, or be it in the form of maybe reports where the organisation would collect/gather findings in a certain area, and then they want to have a document, be it a print document or a digital document, but one coherent document, and the document will feature, for instance, some graphics and I will help them with that. Or recently I’ve been working on a visualisation concept for the data portal for the [Client 2] and the challenge is how to publish hundreds of datasets so people can quickly search or find what they’re looking for and inspect datasets, so they see maybe how far back the [Client 2] has for unemployment numbers, things like that. So that’s more a tool, actually, for users to find certain data.

And then occasionally I work with maybe magazines or newspapers, so they will have an article or a feature in mind where they know they want to have an interactive graphic or an interesting information graphic and I will then do something. These jobs are usually much smaller and much more focused, so it’s much clearer what the data is and what the end result will be like, and sometimes I also work with companies and helping them understand their own processes or how their own company works, or help them communicate something they’re interested in.

HK So a lot of that has ordinary non-experts as end users of visualisations, but is it sometimes more like the last category, helping people make sense of their own data and then you might have more of an internal expert audience?

VP8 Yes, that can happen, and sometimes you also have projects where it’s clear, so right now I have also a project where it’s clear and the end result will be seen by five people or ten, so sometimes you also have very highly focused activities, but it’s important for these five or ten people to have something optimal and that can happen too. One client group is also myself, so sometimes I will do a self-commissioned project more or less, because I’m interested in something or because I feel something should be done with a certain type of data.

HK And is it for you to look at or is it for a broader group of people to look at?

VP8 Yeah, it depends a bit on the outcome, but if I feel it’s important or it’s an interesting piece then it will be published, but if it’s not, and I wouldn’t say that the public is the client then, because it’s more like I decide to work on it and afterwards I decide to publish it or not.

## How much say do you have over the visualisations & the messages they are communicating? What happens if you don’t agree with the client over a visualisation?

HK And how does the relationship normally go? And again, it might be hard to generalise, but it’s a question about whether people are trusting in your expert knowledge about what can be done with data through visualisation, or whether there are sometimes occasions where clients want something done that you feel can’t be done for various reasons. Can you characterise that relationship, or again, is it too varied to be able to do that?

VP8 Yeah, there are some things I can decide. So by now I try to make it clear very early in the project, so usually we have a kick off meeting together and the client will tell me a bit more about what they want to achieve and why we’re doing the project and which data we have available, and I will usually tell them a bit about how I work, and usually I try to make clear very early that it’s best if the client gives a lot of input in the beginning and about the strategy and why the project is important to them and who they want to address, who else is doing similar things, just to understand the scope and the context of the project. But then it’s good if we develop the solution together, but if they leave the concrete designs decisions actually to me, I try to get their promise very early in the project, because there are different types of clients and they expect different types of influence on your work. And in my experience it doesn’t work that well if a non-educated designer makes detailed decisions in a design, both from a skill level but also from a communication level, at some point, if you do that too much and if you let the client actually pick colours or decide button sizes, you’re in trouble in a project, because it will never be finished and there won’t be a coherent overall vision as compared to if a designer develops a coherent overall language. So in the early phases I try to involve the client a lot when it comes to the content discussion and, let’s say, in terms of charts or why certain visualisations deliver certain insights that others don’t, so I try to involve them a lot there and we try to work that out together, but then when it comes to how to transform these insights into a coherent whole, I try to reserve as much decisions-base as possible. And sometimes it works better and sometimes it’s worse, but by now it helps that I have a reputation and people book me specifically for a specific style or approach, and so there is a certain level of trust so I can actually have a better negotiation position. But it can still happen that it’s all good with the team that you’re working with, but let’s say two weeks before launch, somebody from management says that it has to be blue or green, that can still happen.

HK So what happens if it’s like that, what would you do?

VP8 That’s a tricky one. If it happens early in the project I would try and re-discuss the roles and make that argument again that it doesn’t make sense that the client makes these very practical design decisions. If it happens very late in the project, probably you will make some concessions and just try and maintain the integrity of the overall product but be okay with a few. I mean that’s important too, it’s fine if everybody has a little piece of the end result.

HK Yes, it’s one thing to say make it blue instead of green, but it’s another thing to say, ‘Tell this story with the data rather than that story with the data,’ and does that ever happen, or do you have strategies for nailing that earlier on to avoid that kind of problem?

VP8 Yeah, so first of all I try to make clear that we shouldn’t have too many preconceived ideas about the stories we tell before we have looked at the data in detail and see if the data supports these ideas or if we maybe find new stories in the data. And so often the first third or so of the project is I’m busy with trying all different kinds of thoughts and visuals for the data and try to gather a lot of different perspective on the same datasets, so I can, with the client, together discuss. For instance, in this project it looks like the data tells us this and that, but if we look at it from another side it actually disappears. And so in this case you sort of have a choice to make, like which points do you want to emphasise and which others do you put more in the background. But I really try, so usually I won’t work on projects where the client already has a previous story in mind and then it’s just looking for the data, or wants to have that story delivered no matter what the data says. Because this I can detect fairly early and I actually won’t do these projects, and then, not often, I have discussions maybe about more marketing type or PR projects that stop actually at that point, where I realise it’s more about communicating a preconceived message and then people just try and somehow make the data fit that message, so I try not to do that!

HK So you mostly can avoid that by detecting that?

VP8 Yes, because that will come out very early and I will still not fix a contract before I have a good understanding of their basic mode of collaboration and that data is a more data-driven approach overall.

## What kinds of technologies do you use?

HK And what kind of tools and technologies do you use?

VP8 It depends where I am in the process, so in the beginning it’s mostly about quickly producing a lot of different views on the data, so I’d use standard tools to do normal diagrams, I might use Excel, I might use Tableau, I use Python to manipulate the data, so if I need to merge two tables or transform the data in some form I will usually use Python. Also, in this early stage, I often will make quick sketches, like self-program stuff in D3 or in processing, and for the end result it depends a bit if it’s a web-based visualisation, I will usually use D3 and Java Script, HTML. If it’s more an installation or something that runs on one machine, basically, it might also be Java and processing.

HK So does the intended audience influence the choice of tools a bit in that, the context will influence, the context in which it might be viewed?

VP8 Yes, it’s a couple of things, so one is the delivery format, let’s say, if it’s based on the web or if it’s interactive installation or if it’s a print piece, this will ask for different tools. And the other thing is of course also if it’s maybe, let’s say, a small project where I can’t go into a big deal of customisation, then I will more resort to standard tools and the more freedom I have resource wise to try out new stuff, the more it will be self-programmed and self-met.

## How do you go about researching and preparing for a visualisation job? What resources do you draw on whilst carrying out a job?

HK So how do you go about researching and preparing for a visualisation job? You’ve already answered that a little bit by sort of saying you’ll try to find out whether the person has a preconceived idea about the story that will be told, and have you got a kind of process that you go through, or is it a little bit ad hoc or is it systematic? How do you research and prepare?

VP8 It depends and some clients have actually no idea, they just have a database, and then you need to figure out what do we do with that, who will need that, who wants to draw something out of that? And so in that case you would have to first find out what are actually the users or the audience you’re addressing and what are their needs? In other cases, they might already have an idea, or maybe they have a report already, and they have already a good idea of what the important themes are, but they don’t know how well they’re represented in the data. Maybe sometimes you have to search for new data sources as well, so sometimes it’s not enough what the client will be able to provide you with. And usually I try to also learn a bit about the topic about the domain. And another client group, actually, are scientists, so I work with scientists also quite a bit. So usually I try to read at least a few papers or publications from that area to understand a bit of what’s the state of the art of the research and what’s important, what are the main concepts, because otherwise you might be missing very obvious problems with your visualisation. You need some of the main knowledge, and often the client will bring it in but I try to at least read up on the basic concepts. And then it depends a lot on the work distribution, so let’s say when I worked with the [Client 1], they will have analysts already and experts, and then I’m just the graphic’s guy. And in other cases, when we have a client, ‘We just have an interesting dataset here, can we do something with it?’ then I have a more complete role. Sometimes I do a complete, so in the sense that I help them figure out what an interesting story is.

HK And you do some of the analysis of the data as well if they’ve got a fairly raw?

VP8 Yes, I like to do that, even sometimes maybe I work with scientists and they have their own data analysis and I will ask for the raw data and play a bit with it myself just to get a feel of what’s in there. And whenever you do some analysis you’re also leaving out stuff, and maybe for our exact project it would be nice to have that extra stuff or have the granularity of the data, so I always ask for as much of the raw data as possible in the beginning. So those are the two things actually I want from the client: one is like a general direction and a strategy and the purpose for the whole thing, and the other is the dataset, because that’s another mistake or something I learnt from projects that went wrong, is if you work into the project for too long without having a concrete dataset, you might be working in the wrong direction or you might develop a good concept, but then figure out we don’t have the data for that concept.

HK So do you ask for the dataset before you sign a contract?

VP8 Yes, in that first phase at least, yes. And if I feel not 100% sure if the data will support the project or if the client will be able to work with me on a good project, I will often do a first contract just for a concept development phase, where I look at the data, we discuss what you need, and then we’ll discuss a few alternatives of how that data could be presented. Also, maybe sometimes people don’t know if they want just a single static graphic or a fully interactive thing, or a movie or whatever it could be, and so if that’s all not clear then I will scope a first fairly quick concept, the data exploration phase, and that we use together then to develop the plan, let’s say, for the actual project. And maybe one out of five, or maybe one out of eight projects, stops at that point also, because we both realise either we can’t work together well or the data is not good, or it doesn’t make sense to do the big thing, which is fine too. I’d rather fail there at this point rather than getting into big commitments and then realise there’s a problem.

HK Are the clients generally all right about that, because they’ve already invested something at that point?

VP8 Yes, I will always deliver something, so it’s not that I just fail! They will have an analysis of the data and they will also, for instance, have like an expert’s opinion that their data is not good for the thing that they want to do, and that’s also like a step further in their process.

HK There’s a question about the resources that you draw on whilst carrying out a job, and again I think you’ve answered that to some extent by saying that you want to know about the strategy and the purpose for the client. So I’m just summarising the resources that you draw on, so one is knowing the purpose from the client, one is the dataset from the client, and another is the reading around the subject area that you say that you do. Are there any other things that you pull in that you would see as resources that help you do a job?

VP8 Yeah, I mean I will do some sort of research on existing solutions in the area, so let’s say we have a report on gender inequalities, I will look at different visualisations of how that has been solved before and there will always be like reference examples, but I usually don’t share that with the client because sometimes it might draw them already too much into certain directions, but I do that just to understand the context, and that’s mostly it. And then a lot is about exploring the data, exploring the design solutions, talking to the client and then narrowing down to a solution.

## Do you user test visualisations before sending them to the client? Why/why not?

HK So do you ever do user testing, involve users in testing and prototyping?

VP8 Not much, no. Maybe sometimes for when I’m fairly unsure about certain decisions, so I recall situations where we would have colour pallets, so we did this project and it was about positive and negative emotions and we had five different colour pallets and we as a team, and there were a couple who completely disagreed on the meanings of these colours, and so that was one case where we actually did a quick online tests and just gathered a few opinions. But usually, especially for the early prototypes, I trust my judgement skills, like from experience, and also try not to get too much user feedback before we actually have a working prototype, or like something that is very close to the end product, actually. Because in my experience, in data visualisation it’s a bit hard to envision how it would be like if it would actually show useful information, and also you have the system working in order for people to judge if that is useful, like the way the information is presented and the way they can navigate and so on. Also, because I often do things that are non-standard and you need to see it working in the context and how it’s envisioned. And so usually I rather recommend to do a very lean or simple first version, but make that one complete with real data and proper stuff and everything formulated out, and then put that out and publish it and then see how people use it and then use that to feedback into a second version. But in my experience, it’s very difficult to do early participatory design or early user testing before you have a working thing.

HK So do you write that into a costing that there would be a lean version 1, and then version 2 full and complete comes a bit later?

VP8 For the large project, yes, so it depends a bit. So some projects it’s clear, it’s an ongoing activity, or it’s a large project and it will need certain rollout phrases, but many other projects are actually one-offs and they are more planed and there is a deadline and at that deadline we have the final version which is perfect!

HK So there’s no room in that to get any feedback?

VP8 Yeah, so that’s my experience or my lesson from this, that there are too many one-offs, it’s both our fault, like the design’s fault but also the client’s fault that it’s planned just as a single thing and not an ongoing continuously refined thing or something that has more versions. So the mind-set is often like we plan one thing, we do one thing and we launch it and then we’re done

HK On both sides?

VP8 Yes, I think that’s the common mistake on both sides. Also I have to say for me it’s not great to have projects that linger on for years, because I want to do new stuff as well, so for these projects that have a continuous refinement project behind them or multiple versions, I will always work with agencies and then I will do most of my work in the first iteration and the refinement and the testing and the last 20% work is often then done by somebody else.

HK So are you saying that those kind of ongoing projects clearly lend themselves to iteration on the basis of user feedback more than shorter term projects?

VP8 Yeah.

HK Because it could still be finite but have that phase that involves that iteration as well, couldn’t it?

VP8 It could work, yes. So if you would plan it into the project, and I do it if I’m really unsure, like it’s a very difficult domain, maybe very specialised, and maybe it’s a critical project. Let’s say I would build an interface for a nuclear power plant, I would plan a few successions! But because I’m more commissioned and usually more artistic works that are more shaped by me, and maybe also from an artistic perspective, it’s less about that in the smaller projects.

HK So if you see it as an artistic endeavour then it’s not so much about usability and it’s about your vision, so that feedback has less of a place. But if it’s more of something to be used by people to achieve things then there’s more space for that user input?

VP8 Yeah, and then it’s also more important, obviously. So now for the data portal, for instance, we now have a three or four month ((better 0:27:54?)) phase where the whole product is already published and we gather feedback from inside the organisation but also from users and have a full four month period to do the last 10 or 20% in dialogue with the people who are actually using it. And I don’t think these big projects or tools can be designed in a different way, but many of the projects don’t have strong tool characters but to them I’m more communicative or more artistic, and then the concrete user feedback becomes less important.

HK And on those projects where there is user feedback and input, is it you that is managing that process or is it the client or another member of the team working on the process? Do you get stuck in directly with the users sometimes or not much?

VP8 It will be organised then by an agency, because a) it’s not my domain expertise, and b) there’s also quite some logistics behind doing user tests and evaluating user tests and I will then rather be confronted with the results of these, or maybe on critical questions for the data visualisation, or if I have maybe a question coming from the data visualisation I might prepare alternatives or look at the raw responses or look at video recordings, but usually I’m more confronted with the results and some usability experts will do the actual user study.

HK Was it present a little bit in your training? Did you say your MA was in interface design?

VP8 Yes, so from that I have at least the basics in usability and user experience design, and then also evaluation. But for me personally, it’s never been a strong focus of my work, so I’m much more in the tradition of not so much user-centred design but more a designer-centred design!

HK Or artistic, where people see what they’re doing as an artistic endeavour and it really is about your interpretation, isn’t it?

VP8 Mm-hm.

## What informs your choice of fonts, colours and other elements of the design (that are not directly related to the data)?

HK So what informs your choice of things like font, colour and design elements that are not directly related to the data?

VP8 Yeah, I mean that comes out of this sort of emerging into a topic and personally I usually try to find ways so that the visuals communicate something between the lines as well, so they will often communicate what I’ve found the most striking features or the most interesting structures of a certain phenomenon and I do try to find fonts that represent the phenomenon I’m talking about as a whole, and then also help people maybe tie their memories of the graphic to the theme so that it’s not totally arbitrary and if I do something about, I don’t know, the stock market, it will look different then about Wikipedia or about bees. And so I try to tie the design to the theme and the findings, but it’s a bit hard to tell how that works in general!

HK So it’s about your own sense of what works aesthetically and what aesthetics are connected to what topics?

VP8 Yeah, and it’s often the quintessential findings, so I collect a lot of different views on the data, maybe ten different ways of plotting the data, and some of them are more extended, some of them are more unusual, and there will be recurring themes or recurring interesting spots where you always return to and you say, ‘Actually, no matter how I plot the data these seem to be the striking features of that specific dataset.’ And then I try to find for the end result a visual that encapsulates all of that, the boiled down version, maybe like the shortcut version, so I took the long and rocky road of having to explore all these different views and then I tried to present the user in the end with the most scenic route, based on my knowledge of the territory! And I leave out the stuff where I say, ‘Yeah, that looked interesting but it didn’t lead anywhere, you don’t even need to go there, but this path here turned out to be very rewarding,’ and so I will offer it to the user, so that’s the general idea.

## What do you understand to ‘work’ in a visualisation & why? Is it possible to answer generally, or does it depend on the specific visualisation?

HK Do you have a sense that these work in a visualisation and these things don’t work? Can you generalise about that, or again, does it depend on the project and the purpose and the intent and the client and the audience and so on?

VP8 Yeah, everything is relative all the time! But I do think there are a few recurring, let’s say, themes or a few techniques that usually work. And if you have, let’s say, a print graphic or like a magazine type print graphic, like a full page or so, I think there’s a certain information density and a certain way you can establish information hierarchy, where I can judge extremely quickly if a data visualisation works or not, even before looking at all the details, or even before understanding the concrete findings or the facts presented, but just from looking at how is it structured, like do I have an easy way into the graphic, are there some obvious striking features that I can detect immediately, but is there also something left for me to explore by myself, and is there a level of detail that keeps me going? Or to put it negative, there are a couple of ways you can fail in such a graphic, so one would be you present everything on the same level, so you have a lot of unconnected individual facts and you’re just overwhelmed by the detail. That would be bad, or if you present very simple things but in a very big way, but then it stops. So you deliver something that’s only good for 10 or 20 seconds but you could have told a much deeper story, and then you fall flat, and then somehow you need to balance that, like what other, the quick and simple insights that lead people into a graphic, and how do you make sure things are understood, the most important things are understood actually first! That’s always good! And then how do you keep people engaged? It’s a bit hard to say but I do think there are a few, or if you can judge graphics if you have singled out pretty quickly if they are at least promising to deliver that, that sort of experience.

HK So if you were to turn that into some principles of what works, you would say making it clear what’s most important so that that’s understood first, working with a range of levels so there are ways into greater detail, to keep people interested? I’m just trying to rephrase it as a set of principles.

VP8 Yeah, or to make the theme of the graphic clear, so often I see graphics and I actually have to read the labels to even see what they’re about, if it’s about ships or authors or the weather. So if that’s not immediately clear I think it’s a shortcoming, often.

HK And you think that should be clear in the visual choices that have been made?

VP8 The visual choices or a headline or illustration material, but some way of tying it, and also providing some anchors so you can retrieve it from memory. If you do something that’s very generic visually, you will never be able to memorise the graphic. And then to me it’s often about making sure the most important structures are immediately apparent and very clear and are understood effortlessly, but then also leave quite a few things to be discovered, because I think the knowledge that we discover ourselves or that we have worked for is actually the one that sticks best and that we remember best. If there has actually been a certain path into the development leading me to an insight or leading me to a question that would trigger me or cause me to look up stuff myself, I’m convinced that people remember that and make sense out of this type of information much more than if you prepare everything and pre-adjust it and just present people with the facts.

HK So how does that fit with simplicity? Because some people answer that question by saying that simplicity is important and that it is achievable, but I think you’re saying the opposite of that in the sense that if everything was simple and understood straightaway and you didn’t have to work to find stuff out, it would be less memorable and adds up to a less engaging visualisation. So would you contest that idea that simplicity is important?

VP8 No, I think complexity is important, complexity is possible! And in fact I would go so far as to say that if you have a simple point to make you don’t need graphic. If you actually have a very simple point that is convincing on its own, like without any support, it’s fine if you do an illustration or if you do just a photo with one headline or a subline and that’s it, and so data visualisation is exactly needed where it’s a bit more complicated, where there are different sides to one story, where you have a multifaceted phenomenon, where you have granular data and messy data, and different ways maybe to read the same dataset or to think about the same phenomenon, then data visualisation becomes important and interesting. If you have only a simple point to make, I think in these cases at the moment, data visualisation is actually overused and people think if they have a simple point and they put a chart next to it, it becomes even better. I don’t think so. I think it would be more honest to just make that simple point and not pretend there is some deep data behind the simple point.

## What kinds of skills do you think people need to make sense of visualisations? What problems do you think people have in understanding visualisations?

HK That brings us on to the next question which is about what kinds of skills do you think people need to make sense of visualisations, because I think in that question there is a sort of a sub-question about how do people get on with complexity? If some of your projects are for news outlets or organisations, global organisations like [Client 2], who might want to be communicating with the very broad and general audience. So let’s start by saying what kind of skills you think people need to make sense of visualisations.

VP8 I think first, most people have to be curious and have to be willing to figure something out. I think that’s important, because if we only cater to the expectation that everything is self-explanatory and you don’t need to think beyond the obvious things that you see, I think that we’re not ((training 0:40:08?)) the right skills. I think people on the one hand have to be willing to actually go in detail in a graphic and understand exactly how the vision mapping works and what everything stands for and really study the graphic, I think that’s the first thing. And the second thing is I think it’s really important that the audience also reflects what the data actually means, like how was it measured, what does it include, how is it aggregated, what is a potential bias in the data, which other datasets would have been interesting too? So I think in order to make sense out of a single visualisation you have to also think about what is not shown and what could have been alternative views of the same data or what could have been other views of other datasets that would have been complementary and so on. These skills, and also if we keep the visualisations a bit more exploratory and open, so people don’t have the false impression that everything is already thought and they don’t have to think any more.

HK So people need to be willing to think critically about what is not there and what else could have been done?

VP8 Yeah, and how the data was transformed to end with that presentation.

HK How do they do that?

VP8 The people?

HK The people!

VP8 It’s a good question and I think often they take very much for granted what they get, so when I work with data I know how much decisions are being made along the way until the end product comes out the way it does, and so I’m very aware of all these contingencies and all the non-necessities, like where actually somebody made a certain call, more or less, and it could have gone another way and the truth presented would have looked a bit different. And then when I see how people perceive data visualisations, I think they trust too much the power of numbers and the power of visuals, that what they see is a proven fact.

HK So what can we do about that?

VP8 I think one cause still belongs to the realm of science, so data visualisations are strongly associated with science and with expertise and experts and lab coats! And I think the more we get it out into other worlds, I think the more people will understand it’s one way of putting things but there are also different ways of putting things. And I think a lot has changed over the last five years or so, coming to the, let’s say, democratisation of all the tools and the skills and more normal people becoming familiar with how data visualisations are made. And maybe I think it would help if everybody would learn how to do data analysis and data visualisations, or maybe go through that process from, first of all, a theme or a topic, and then what do we actually measure to make that topic measurable, or that phenomenon, how do we then transform the data and how do we find good visuals to represent it? I think it would help if people actually went through that process themselves, because only then you realise, ‘Oh my God, it’s so much creative freedom here!’

HK As part of their education?

VP8 Yeah, and really I’m shocked, and so I work a lot with scientists and I often give workshops to scientists, like PhD students, and I’m really very confused why it’s not part of basic scientific education for everybody who goes beyond at least the basic degrees, that they don’t have like communications as a mandatory subject where they have to take a course, and visual communications but also general, like science communications.

HK So you were suggesting that the more visualisations become part of everyday life, and the less they seem to be part of the domain of expert scientists, that the more people might relax their belief that this is true, that the numbers are true, they might be more open to thinking about the process by which the visualisation got created.

VP8 Yeah.

HK That’s interesting. So what problems do you think people have in understanding visualisations? You might feel like you’ve already answered that, but just in case you’ve got anything that you want to add.

VP8 It’s tricky. I think often people are scared away by complex visualisations and in similar ways they’ll get away with mathematics or they think it’s not for them, it’s something they don’t understand, but they would understand it very easily but it’s more a psychological barrier. I think much could be done and is already being done in maybe explaining complex visualisations better and thinking more about the layman’s perspective there and how to walk people through the complex representation. And I think at the same time it’s my experience that people can deal with a lot of non-standard visualisations if they feel it delivers something of interest to them or if it’s, let’s say, playful or just stimulating. So the [Client 2] [Project 1] which I worked on, it was accepted very well and people actually go through the efforts of understanding the value, ((strange table 0:45:58?)) visualisation, but because they feel it’s attractive and is also important to them. If it’s given, then people, in my experience, go through great lengths to find out what something means, if it looks promising.

HK So what are you basing that assertion on? Have the [Client 2] kind of tracked people’s engagement with it, or have you, or is it feedback you’ve got?

VP8 We have a mix of feedback channels, so we see what people do on social media and how they comment on the thing. We can also see that people spend a lot of time on the site, so we are actively monitoring on things like the balance rate, like how often do people just open one page but then go away, which is usually a bad sign. And we know, for instance, for the [Project 1] that the time they spend on the time is about twice as of other websites, so they do spend a lot of time playing with the interface and trying to make sense of it and understand it. And what we can read from the tweets, for instance, if they refer the information back to them, so they will play with the site and with the rankings, and then write something like, ‘Oh, the [Client 2] says I should move to Australia,’ and that’s a simple thought, but it’s a thought that was triggered by the display of the data and they will think about what that means to them, and then they even make the effort of communicating that to others, and I think it’s a big achievement, that a website will cause them to think about moving to Australia!

## What do you think about the premise of our research that there is not enough understanding of people’s engagement with visualisations within the field?

HK The final question is whether you think our premise is strong, that we don’t really know or understand what happens when people engage with visualisations, do you think that’s a reasonable assertion to base the research on?

VP8 Yeah, to some degree, probably yes. So many people have, if you’re not trained, often many people have misconceptions about statistics, for instance, like probabilities or things that are more natural to a scientist are not immediately natural to somebody who’s not trained in fields like that, and I think that carries over to visualisation, so they might misread. I think quite often if you present proportions of something and then another proportion of something else, people often get very confused, but that’s not directly because of the visualisation maybe necessarily, but because of the concepts, you have to learn the underlying, the mathematical reasoning and the statistical concepts, you have to understand the thinking before you can even make sense of the data visualisation, so it might often be statistical literacy. And the other thing is, from my experience, some people read and I’m often surprised how graphics are misread, so I think you have an interesting field of investigation there!

HK Some people say that they don’t think that people need statistical literacy if the visualisation is well done and doing its job.

VP8 Could be, yeah. I mean maybe that’s the ideal case and that the computation is done by the visual and by the expert and you’re just presented with the truth, but often in order to interpret what you’re seeing you have to understand a bit of this context. One thing, for instance, like a certain group of people, in my experience, have struggled with the reading layout where the ((x’s 0:49:52?)) don’t have an explicit meaning. So if you do, for instance, a network layout, where you just base the positioning of notes relative to each other and you say things that are more strongly connected tend to move in the same area, but it’s not important if it’s left or right or top or bottom, you could rotate the whole graphic, and this is something that some people say, ‘Yeah, of course, that’s supernatural to me,’ and others are like, ‘What’s going on? It has to mean something that this is on top,’ or they just cannot understand how you would even do such a graphic, they find that offending almost and they will systematically then read these charts the wrong way! That’s interesting, it’s a small group of people but I keep meeting them, they are not able, apparently, to relate to the idea that these x’s are just implicit and not explicit!

HK Does it bother you in your work, thinking, ‘Yeah, on the whole people haven’t got the scientific training, they haven’t got the statistical literacy, I’m busy making this thing that a lot of people are going to struggle to make sense of or not invest the time in making sense of it,’ or do you just get on with it?

VP8 I’m relaxed about that, so I’m always happy when somebody discovers something they hadn’t known before or is drawn into a topic they hadn’t considered interesting before, that’s already a win. And I don’t care if everybody gets all the details always right! I think much more in terms of broad senses and also long term perspectives. I mean the field of interactive data visualisation, I think the most interesting things have happened in the last 15 years and it’s 40 years old mostly and the most interesting stuff has happened in the last 15 years, so I think we need to give it another 20 or 30 years before we can either make best use out of it in the sense that people understand what it’s good for, how it works, but also we as designers have figured out what it’s best used for and which other media are better for other things. I think all these things take decades to figure out so I’m more relaxed! I don’t need to get everything right now, or not everybody has to get everything right now, I think in much more long term perspectives.

HK That’s great, really interesting answers, and if you’re right, and I think you might be, then it’s challenging to equip people with the skills to make sense of visualisations and it’s a big challenge, but I tend to think that people do need that statistical literacy and not that the visualisation can do all the work, so that’s our challenge here on our research.

VP8 Keep me updated. When do you think you will have a report or some results?

HK We’re going to try and do all these focus groups in the next three months or so and then we’re obliged to give some presentations in November when we’ll have something to say, so it will take a while to process it.

VP8 It’s messy and expensive in many areas and I’m curious to see how you will handle all that!

HK I’ll definitely keep you informed. Thanks ever such a lot, it’s really interesting to talk to you. Thank you, bye.