CUTTING EDGE DEVELOPMENTS IN PSYCHOLOGY: VIRTUAL REALITY APPLICATIONS.
INTERVIEW WITH TWO LEADING EXPERTS

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Abstract
Virtual reality (VR) has captured the attention of professionals in the field of psychology as a highly promising method/tool in the assessment and management of various psychological problems (e.g., anxiety, pain, ADHD). The International Institute for the Advanced Studies of Psychotherapy and Applied Mental Health at the Babes-Bolyai University has recently developed a complex Virtual Reality Platform with multiple applications in the field of applied psychology (e.g., psychological assessment, psychotherapy, education, motor rehabilitation) (www.clinicalpsychology.ro). To explore the cutting-edge developments in the field, I spoke to two leading experts in VR applications in psychology about the potential and benefits of this technology: Dr. Albert “Skip” Rizzo and Ken Graap. The current state, future developments and challenges are discussed.

Keywords: virtual reality, psychotherapy, assessment, technology

INTERVIEWS

1. Interview with Albert “Skip” Rizzo, Ph.D

Daniel David (DD): Could you make a brief presentation of VR and of what you are doing right now in this area?

Albert Rizzo (AR): I am a clinical psychologist/neuropsychologist and an Associate Director of the Institute for Creative Technologies at the University of
Southern California, and a research professor at the USC School of Gerontology and Department of Psychiatry. I direct the VRPSYCH lab, which focuses on the design, development and evaluation of virtual reality applications across a broad spectrum of clinical disorders. We develop applications that target probably what I would call the three points of the human life triangle: psychological functioning, motor functioning and cognitive functioning. In the area of cognitive functioning, we address issues of memory enhancement, memory measurement, assessment of attention, assessment of visuo-spatial abilities. In this research we are studying the use of VR applications with children with attention deficit disorder on one end of the life span continuum and Alzheimer’s Disease at the other end of the life span. In the motor rehab area we focus on working with physical and occupational therapists to develop a wide range of motor assessment and rehabilitation tools for people following a stroke or other brain injuries, and also motor coordination tools in children with autism, which seems to be a relevant issue. On a psychological level, we create and test applications for exposure therapy, so we are addressing post-traumatic stress disorder using VR to deliver graduated exposure for people returning from Afghanistan and Iraq. Virtual Iraq being one of the best known applications that we’ve done. We’ve also done some other things using panoramic video exposure stimuli for anger in the workplace and social phobia, although we haven’t really tested the social phobia applications yet. Umm let’s see, we’ve also done work in another area, pain management, where we put children in game-like virtual environments and use the engaging features of the game to distract the child from painful medical procedures. We focus on very common procedures like IV insertions, needle sticks, lumbar puncture and now we are about to do a study with chemotherapy. Finally, one of the areas we are now moving into is the development of virtual human patients that have artificial intelligence that can be used as a tool for training clinicians in how to conduct clinical interviews and hopefully make better diagnostic decisions. That’s the general overview.

DD: What would be a simple working definition for virtual reality therapy? A working definition, not necessarily a comprehensive one...

AR: For me, the best metaphor is to think about VR is to think about how an aircraft simulator serves to test and train piloting ability. Well, we can do the same thing in the clinician’s office with virtual reality environments that put the person in a context relevant environment and test, train or treat whatever the psychological, cognitive or motor condition that is being addressed. I think the idea is that psychology has relied a lot on using imaginal processes in therapy which are very good and we’ll continue to use, but we never know what’s going on in the unseen world of imagination. So if we can create simulated environments, where things happen of relevance for whatever the clinical condition is and look at how people behave and what they say they are thinking...
and what their physiological responses are, then we can do therapy in these environments, we can bring the outside world into the clinician’s office and we can systematically manipulate what goes on in a progressive fashion.

So, for therapy for PTSD, we can gradually expose a returning soldier with post-traumatic stress disorder to progressively more provocative stimuli in order to conduct a graduated exposure that seems to be effective in that treatment. So it gives the psychologist the capability to control stimulus presentation in a very systematic fashion. My personal feeling is that that’s one of the key elements of why VR might be helpful.

DD: How do you see the relationship between VR and classical paradigms in Psychology? I am talking about Psychoanalytical, Cognitive Behavioral and Humanistic?

AR: Well, I think virtual reality may lend itself to behavioral therapy quite easily because you can create simulated environments that people behave in, but I don’t think it’s restricted to any one theoretical persuasion. So if you talk about Psychodynamic theory, where you’re attempting to focus on childhood issues and make interpretations of those issues, perhaps VR could be applied by an analyst by putting a patient in a replica of what their home environment was and then have virtual characters that would actually have photographic resemblances to their mother and father. And you could ask the patient to express “what would you tell your mother now?” I think you can use such simulations for whatever you can creatively imagine would be useful for the therapy as long as you have a reasonable theoretical “rudder” to guide the approach.

DD: Would you see virtual reality therapy as a school of psychotherapy or is it a new methodological development, more like a tool than a new school in psychotherapy?

AR: Yes, I think that the biggest mistake people can make is to add a lot of hype to the virtual reality tool, to make it sound like a God-like methodology, or a God-like theoretic or therapeutic approach. Instead, it’s simply a tool that requires a good clinician that has a good theoretical background and understands how to work with patients. It can be a useful tool that can be employed efficiently in therapy. But theoretically, there may also be a lot of problems that are addressed in therapy that perhaps the assets of virtual reality don’t fit. Again, VR is simply a tool that can extend the skills of a well trained clinician to do therapy that is informed by good theory and empirical research.

DD: Such as?
**Clinical Forum Section**

**AR:** Such as bereavement. There are some things that are existential crises that a therapist can help a person come to an understanding about, understand their own thoughts and what they say to themselves, which I think they can do, if they are good, well-trained, thoughtful clinicians that can provide that kind of a setting, without relying on any kind of a tool, like VR. I mean, I consider myself now to be a VR specialist, not in that I’m doing therapy with VR in a specialized way, but I understand human factors psychology regarding the value of the technology for human interaction purposes. So from my clinical experience, I know what the needs of clinical applications or clinical targets are and I bring these elements together when it makes sense. I have a focus that sort of goes beyond being strictly in Psychology or being strictly in Neuropsychology or any of that. My evolving career has grown into something where I kind of just rattle the fence in an interdisciplinary way between these areas. But I think Psychological science can benefit dramatically with recent enhancements of technology. We can do things we couldn’t do before and now it’s our job to take 100 years of Psychology as a science in the real world and see how it applies and how we can advance it in the cyber-world so to speak.

**DD:** But maybe this technological development could later inform Psychology at a theoretical level, develop maybe new ideas for new theories...

**AR:** I think we can observe behavior in a more relevant fashion, by seeing somebody act or behave in a controlled simulated world, in ways we might not be able to see in the real world. We very rarely can follow a patient around in the real world-- we have to just rely on self-report and retrospective descriptions, which are sometimes quite inaccurate. By constrast, with VR ...I think we have the ultimate Skinner box, we can observe human behaviors in environments sometimes that are very much like the real world or at least the person acts as if they’re the real world, and record their responses. So I think it will certainly provide an understanding of human behavior and human cognition that would be challenging to achieve in any other fashion.

**DD:** Can you, very briefly, tell us, what you think about the efficacy of VR for, let’s say, different disorders as compared to controlled and classical therapies. Is it better, does it have the same efficacy?

**AR:** I think exposure therapy is the area where VR was first applied clinically on a wider scale and the literature in that area indicates that it works better than imaginal exposure and is as good as in-vivo exposure. We know in-vivo exposure is a gold standard, but it’s definitely not very practical in a lot of cases, if at all. As long as we can demonstrate value by outperforming more traditional approaches as imaginal exposure, and with at least equal outcomes as the more unwieldy in vivo approach, I think that the cost of the technology is worth it.
Technology costs have dropped dramatically over the last couple of years. We have a meta-analysis that compares VR with imaginal and in vivo exposure therapy and the common effect sizes across different phobia types are anywhere from 0.79 to 1.33, which is quite encouraging and is consistent with another group’s meta analysis results in Europe (Powers and Emmelcamp, 2008).

**DD:** Pretty large effect sizes...

**AR:** Yes... So in that area we have documentation. We’re also getting emerging documentation in the VR motor rehabilitation domain. I think what that is, is the motivational component; we can make interaction for motor rehab more engaging or compelling and thereby the patient will adhere to the treatment more.

**DD:** There are psychological factors are involved in pain, so we can talk about pain as well.

**AR:** We see pain reduction due to VR game-based distraction and that seems to be a consistent finding across the literature. It works better than simply watching a movie or cartoon, and when comparing the interaction with a VR simulation on a flat screen, it appears that wearing a VR headset adds to the effect.

**DD:** This would be a very brief summary of what is happening in the field now. Can you also tell us how you see the main limits of VR therapy?

**AR:** The limits at this point... The technology is becoming more and more understood so that solves much of the problem. I don’t think cost is a problem as much anymore either. I mean you can buy a headset now for 400$, run it off a laptop; the software over time pays for itself. I think the limits right now are probably related to the sophistication of the interaction. We like to look at VR as a more intuitive, natural way of interacting with the simulated environment, but in reality we are using interface devices that are not so natural to use or to navigate with or to interact with objects in the virtual world. You can learn how to use a game pad and navigate around in the virtual space, but if you want to reach for an object or run, or jump, there are some limitations, so in the actual human-computer interaction there are still limits. The other area where there are limits, but I think people will approach them, is in virtual human technology. As you have seen in the applications, there are scripted video characters that appear, they’re very compelling and are very useful, but I think the real future is going to be in the voice recognition that can foster interaction with a virtual human and the possibility for talk in a realistic fashion with a virtual character. That would involve speech detection, semantic analyzers of speech and a natural language generator with some kind of a personality, so that you can practice interacting in
real time fashion with virtual humans. That’s something we’re starting to do a little work in, but this naturalistic interaction with virtual characters is still away.

DD: I also wanted to ask you how you see the future of VR, the next frontier research in VR, but you have already addressed that issue.

AR: The virtual humans capability and the capacity to foster better interaction.

DD: And the interaction between them...

AR: Yes. Also, technically, we need better head-mounted displays. We want something with a wider field of view and with higher resolution – something that more closely matches normal human viewing parameters. In the future we will look forward to better 3D displays to enhance depth and realism. That is not very complicated or very expensive. It’s hopefully coming down a lot to projection technology being cheaper. I saw a couple of weeks ago a little box with a double projector set in it that projects either two different colors in the same spot or produces realtime sequential stereo using shutter lenses. That’s cool. With the interest in 3D TV that has become popular recently, I expect consumer level displays that will add nicely to the delivery of Virtual Reality at much lower costs!

DD: You helped us set up this VR lab at Babes-Bolyai University. How do you see, knowing the environment now, and knowing our research interests the future, What do you think that we could contribute to?

AR: From what I see in this lab, I think your decision to go with using VR for specific problem areas that have empirical support for their clinical efficacy was well-informed to begin with. Your group has a theoretical background and energy and motivation that are all good indicators for success! And I think it’s great that you have the enthusiasm of a good number of people involved. I can see you doing a lot of different things. There is still a lot of work to do, not just to prove that VR works for exposure therapy, but to expand beyond that and understand what the key elements, perhaps of exposure therapy or of the cognitions that go along with this approach that predict success. I think your group is well informed and positioned to make a solid scientific and clinical contribution in this area.

DD: It’s not only the outcome, but also the theory of change and the mechanisms.

AR: Yes, yes.

DD: Anything else you would like to add?
AR: What I would like to add is that I think this will be a significant direction for Psychology to go in. It’s what psychologists in experimental psychology have always tried to do, construct a space or environment, a lab space, where you put a human subject in, manipulate stimuli and measure the performance. Well, that’s what VR is all about. In therapy we also try to create a space and foster some kind of cognitive-behavioral change, and I think we can now do more things with this. I think there is a bright future ahead, and that as long as we keep in mind that the technology is not the agent of change; it’s the therapist or the researcher and their theoretical approach and how they use the tool – that is the key element. The technology itself is not going to fix anybody or create some new theoretical view, it’s simply a tool, a very powerful tool, I believe.

DD: Thank you very much.

2. Interview with Ken Graap

Daniel David (DD): For the beginning, could you introduce yourself and tell us a few things about your work?

Ken Graap (KG): I was president and CEO of Virtually Better, the Decatur Georgia Company. Currently, I work with CNS Response, Inc. (www.cnsresponse.com). We are using EEG based biomarkers to provide guidance to prescribers of psychotropic medications before they are prescribed. It is an internet based service.

DD: Can you give me, in very simple terms, a working definition for virtual reality therapy?

KG: We build computer generated environments that lead to emotional responses in people so that the therapist can help them overcome their fears, phobias, addictions, stuttering, whatever we are working on. For us, the key is building an environment that elicits an appropriate emotional response we can use in therapy.

DD: How do you see the relationship between virtual reality therapy and the classical paradigms in Psychology? I am talking about Psychoanalysis, Cognitive-Behavioral and Humanistic.

KG: Well, at the moment, virtual reality in our case is applied particularly in cognitive-behavioral therapy. I am not an expert in the Humanist and Psychodynamic theory, but perhaps there is some space there where you can encourage the patient to revisit some past events or have a character resemble
parents or others. There is an article Skip, myself and a colleague wrote that explores the ideas of using these technologies in other forms of therapy.

DD: How do you see virtual reality therapy? Some people think it’s a new school of psychotherapy, other people would say it’s just a technological development. What is your view?

KG: I think it’s really a technological development. Right now, the techniques that are used in virtual reality are taken directly from standard behavioral therapy, so the innovation is in efficiency of treatment, in availability of treatment, ease of treatment for the therapist and also in safety and repeatability for the patients. So these are the main advantages of using the technology, rather than taking a patient, say, to a bridge or an airport or an audience.

DD: Being a technological development, do you think it could still stimulate and inform the development of new psychological theories?

KG: Sure, because now you can begin to manipulate very finely the stimulus; it gives you control over one aspect of the stimulus-response equation. And when you can control the stimulus, you may be able to disentangle things better. So, I think it can lead to better understanding. Whether it leads to new theories, I think... perhaps you get information that makes you change your beliefs about how things work together, but theories will come from sophisticated researchers like clinicians who develop a better understanding of the human mind. And this is good.

DD: Can you tell us very briefly how you see the efficacy of virtual reality therapy as compared to control and classical therapies?

KG: When we test VR therapy, we look for the gold standard of what is being done now and is most efficacious, also what’s accepted in the scientific community. For example, we know that in vivo exposure is the gold standard for some conditions. So we test VR against in vivo exposure for different disorders and we conclude, for fear of flying for example, the same efficacy. There’s no difference between taking people to airports, putting them on planes and using VR. For other therapies, there is a clear advantage in outcome for in vivo exposure. However, often it is very difficult to do in vivo exposure. The trade is: it may not be as efficacious, but people are willing to do it and you can do it. So it’s a decision of the clinician whether they are willing to accept that.

DD: You’ve said that, as compared to exposure, in the case of plane phobia, they are pretty much the same. Do they have the same efficacy?

KG: We have data on controlled studies that show the outcomes are the same.

DD: In that case, why should I use VR and not exposure, what is the main benefit or the advantage?

KG: Benefits are you have increased safety for the patient, you are not traveling to an airport, you have repeatability of the stimulus, you have a controlled space which you can evaluate and you can demonstrate treatment outcome. But in all cases, it is good to use a behavioral test. You also make the patient do it in real life. We should always evaluate the treatment in terms of how it affects real-life behavior, not virtual behavior because this it not so useful.

DD: How do you see the main limitations of VR? What are the main limitations of virtual reality therapy?

KG: I think the limitations are that right now we have to borrow technologies from other developing fields. There is not enough demand in mental health to drive the development itself. So we are constantly making use of a technology that almost fits and we are trying to adapt ourselves to the technology, rather than developing technologies specifically for our purpose. And this is simple economics; you can’t spend a lot of money to sell few products to few people. So in the future we hope that the demand will increase as more people become interested, and we can start to develop things specifically for this area. Now we are depending on the video game industry and the psychophysiology industry to build tools and then we are making them work the best we can.

DD: What do you think is the explanation for this attitude in psychotherapy?

KG: I think... when you are paying clinicians by the hour, there’s not a great urgency to increase efficiency in treatment. So the return on the investment equation on the clinician’s side is not exactly the same as on the business side. It’s simple economics. If we can project more utilization and more sales, we can recover our development costs with little price. And we can order more computers and headsets and get a better price. Because we are not driving demand, we are constantly subjected to the whims of the market space. And head-mounted display is a clear example: in 10 years we have been through at least 4, maybe 5, manufactures. There is no demand for head-mounted displays dragging the market, so we don’t have the ability to suggest the best development for us. We are, in a way, beholden to what they have available at a reasonable price.
**Clinical Forum Section**

**DD:** How do you see the future of virtual reality therapy, the frontier research in this field?

**KG:** The newest research is in big problem areas, eating disorders, addiction, ideas for depression – your group is thinking about depression. So I see a lot of different ways it can go and someone will come up with a good idea. And this good idea will drive a big market development. I hope. This is what I am searching for – an application that can reach many clinicians and ultimately patients; that’s what we are struggling to do. As an aside you can see the STAR-D study which found a large effect for CBT in depression, but a very low utilization rate. When given a choice, people chose medication, not CBT.

**DD:** Even though clinicians, for reasons you’ve mentioned before, are quite resistant.

**KG:** Yes, I think this is an old style of thinking, I think you have to use evidence-based medicine, evidence-based treatments. And people begin to accept the fact that there is a clear winner in this race; I believe the evidence is now pretty overwhelming in anxiety that cognitive-behavioral treatment is the best way to go. Also in depression there is very clear evidence now for cognitive-behavioral therapy and in many areas there is a rich literature of evidence for this form of intervention. Everyone has their own approach and, as long as we keep that there’s a diversity of treatments available, I think you can have many approaches. But ultimately if we are going to get a control on cost and help, there are far more people that need help than help is available for; at least in the US. I don’t know in Romania, but I think we are going to be forced into being efficient in treatment and into finding ways to educate patients and let them help themselves as well. Because you can’t help everybody; there are millions of people who need help and you don’t have millions of hours to work. So you have to be smarter in how you deal with that.

**DD:** You helped us set up this virtual reality lab here at Babes-Bolyai University. How do you see our potential contribution to this field? How do you see our team and its potential and how do you think we could really contribute to the field?

**KG:** Well, one thing, when I came here to Romania, I had no idea about how big the university was and how many resources were available. In terms of labor, your lab has more brains working on these problems than many labs in the rest of the world. You have access to young, dynamic researchers, who are looking for problems and working on problems tactically. And those numbers are working in your favor; someone will come with a good idea. And from what I see, the core team is open to collaboration, you have strong collaborators in Medicine, you have strong collaborators in other areas. I think you can do anything you put your
mind to do. And, you know, that’s a big advantage right now. It’s a new and exciting area of research, there are many questions left to be answered, and I think you have a good potential to contribute and you have a good start at this point.

DD: Thank you.

Conclusion

The goal of these interviews was to explore, together with leading experts in the field, the current state, potential benefits and applications of VR technologies in clinical psychology and psychotherapy as well as the challenges facing this developing domain. Considering the need for improving the efficacy of psychological treatments and for developing efficient and cost-effective intervention strategies (David, Szentagotai, Lupu, & Cosman, 2008), the promises and advantages of VR therapy (Glanz, Rizzo, & Graap, 2003) are undoubtedly worth exploring and exploiting.

REFERENCES
