Chapter 13

Augmented Reality in Art: Aesthetics and Material for Expression

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Abstract Cinematic Apparatus theory of the 1970s set the stage for cinematic deconstruction in avant-garde film art. The material and production elements repressed in the normal ideological apparatus became the arena for new expression. Cinema, through its acceleration of mechanization and sequence, became the essential medium of its era; augmented reality accelerates the electric video image, and holds promise to be the essential medium of our new era. This essay excavates and diagrams the AR apparatus to search out the repressed in viewers' perception and point a way forward towards an avant-garde augmented reality art.

13.1 Introduction

This essay proposes a question: What would be an avant-garde augmented reality art? And how can we get there? The objective is a genre of artworks using augmented reality that challenges the underlying technical and ideological AR structures, the same way structuralist film stimulated audiences through challenging cinema: a contemporary high-tech art that can free thought by pulling apart and revealing the structures of the technology in which we live. This essay will follow a thread through cinema apparatus, video art, and augmented reality that points a way forward.

13.2 Film

Stephen Heath begins his introduction to the collection of essays, *The Cinematic Apparatus*, with an observation on proto-cinema advertisements:

> *In the first moments of the history of cinema, it is the technology which provides the immediate interest: what is promoted and sold is the experience of the machine, the apparatus. The Grand Café programme is headed with the announcement of 'Le Cinématographe' and continues with its description: 'this apparatus, invented by MM. Auguste and Loius Lumiére, permits the recording, by series of photographs, of all the movements which have succeeded one another over a given period of time in front of the camera and the subsequent reproduction of these movements by the projection of their images, life size, on a screen before an entire audience'; only after that description is there mention of the titles of the files to be shown, the 'sujets actuels', relegated to the bottom of the programme sheet.* (Heath 1980)

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The context here, in a compilation of essays inspired by Jean-Louis Baudry's essay "Ideological Effects of the Basic Cinematographic Apparatus," is after sixty years of critics analyzing film on the basis of dramatic text, aesthetic composition, photographed subject, and psychology, Apparatus Theory in the 1970s had finally codified an analysis of cinema based on its essential unique elements— an analysis based on cinema's material for expression or medium. In Baudry's 1970 essay, he draws a diagram of the "cinematographic apparatus" delineating the path that spectators' perceptions normally travel, noting what is emphasized and what repressed. I redraw it here in Fig. 13.1.
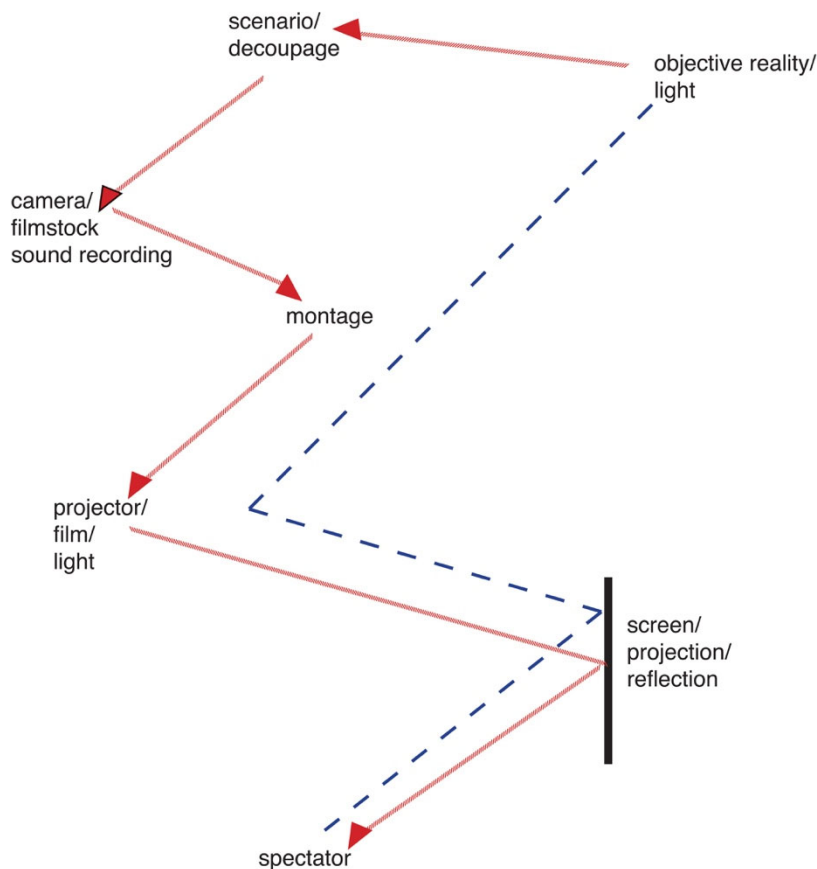

Fig. 13.1 Cinema Apparatus (Baudry 1974)

The text in the diagram notes elements of the apparatus: the cinema screen, the projector, the montage/cutting of the film, the principal production of sound and film, the screenplay, the photo-emulsion-captured images of objects in past reality. We could add many more elements that make up The Film: the dramatic acting, the framing, the soundtrack and sound looping, the business machinations which create the theatres and distribute the film… etc. The solid line draws the actual path of the cinema information, from staged scene, to framed shot on film, to the editing room, projector, and cinema screen. The dotted line draws spectators' perception of

The Film: that of which the spectator is aware. Many of the apparatus elements are repressed in favour of 'suspension of disbelief' and 'persistence of vision' in the cinema experience.

In Baudry's diagram, he emphasizes the analogic quality of cinema; he draws the dotted line to describe spectators that feel like they are seeing the actual captured-objects— not seeing a picture of a car, of a beautiful face, of a camel crossing the desert, but seeing a present car, face, camel. The viewer is still conscious of the filmmaking, but the dotted line represents the extent to which these different elements are actively present in the mind of the spectator. Film audiences are mostly aware of the objects and the screen presenting them, and much less so the other apparatus that deliver it there. It is a sketch of the cinematographic ideology.

In his drawing, we the spectators remain aware of the screen— if not, then we might run from the theatre when a dinosaur enters frame or a gun is shot. Less so are we actively conscious of the projector and the beam emanating from it— if dust or smoke obfuscates the beam, or if the film shakes in the projector gate or even burns-up, then this drawing attention to the projector would be a failure that 'takes us out' of the experience of the movie. Though vaguely conscious of the editing, we are almost completely unconscious of the filmstock and technical sound recording choices— if these things are noticed at all it is a failure of production, such as in cheap B-movies where there are jarring changes between film stocks with different grains or scratchy soundtracks. And the same can be said of the scripting and acting— once we notice the acting of the drama or the scripting of the drama we are no longer *in the drama* where we are supposed to be. And while watching the film, we are almost completely unaware of the larger *dispositif*: the business operations of the studio, the transport operations of the cinema, the entertainment economy that has resulted in this film being presented on this screen.

Artists contemporary with Baudry subverted this standard perception through different techniques. They sought, through the elements repressed within the cinematographic apparatus, a fresh material for expression: a material essential to cinema capable of an avant-garde film art. Anthony McCall created films that emphasized the projector beam. Stan Brakhage made films that emphasized the interaction of the projector light and the material of the film strip itself. Flicker-film makers like Tony Conrad and Paul Sharits created metrical montage films that emphasized the cutting and rejoining of film strips and their mechanical movement through the projector light. Filmmakers like Jonas Mekus, Kenneth Anger, and Jack Smith made avant-garde films that turned upside-down the emphasized and repressed areas of production, scripting, and performance. Avant-garde film sought to rupture the ideology inherent in the cinematographic apparatus and create a fresh image capable of inspiring new thoughts, emotions, and politics.

This achievement is what we seek for AR.

13.3 Video Art (Live)

Avant-garde film art was achieved in the television era. At that time, in a newly wired world, a media art and philosophy that could address technological connections and circuits were exciting and important. And, perhaps, there are special opportunities for critical perception in times of technological revolution. McLuhan in *Understanding Media* makes the analogy of sound waves becoming visible just as a plane approaches the sound barrier like a medium revealing its nature when it is technologically transformed:

The sudden visibility of sound just as sound ends is an apt instance of that great pattern of being that reveals new and opposite forms just as the earlier forms reach their peak performance. Mechanization was never so vividly fragmented or sequential as in the birth of the movies, the moment that translated us beyond mechanism into the world of growth and organic interrelation. The movie, by sheer speeding up the mechanical, carried us from the world of sequence and connections into the world of creative configuration and structure.
(McLuhan 2003)

It is easy to project McLuhan's analogy forward and wonder what insights for electronic video can be found in our new digital-interactive era that accelerates the connections of electric images.

Video art is typified by its technical structures. Like the proto-cinema program cited by Stephen Heath, video art in the gallery is frequently defined by its apparatus— the apparatus locates the genre. A Bill Viola video work, represented on James Cohen Gallery's website, describes the artistic material, "Color High-Definition video triptych, two 65" plasma screens, one 103" screen mounted vertically, six loudspeakers (three pairs stereo sound)" (for the work, *Ocean Without a Shore*, 2007). SFMoma, in their web catalogue, gives the genre or medium of Peter Campus' 1975 video artwork *Dor*, "closed-circuit color video installation," but to truly locate the work they further note, "A discreet video camera is placed near the entrance, filming visitors entering and exiting the space; their live image is projected onto an adjacent wall." In description, these are not video works primarily made of subjects, scenes, or even images, instead they are configurations of wires, capture devices, and rendering screens.

In 1976, as video art became prominent in the art gallery scene, Rosalind Krauss published her well known essay, "Video and the Aesthetic of Narcissism," which addressed many of the new video works, including the above-mentioned *Dor* by Peter Campus, and hypothesized a fundamental shift in the practice of art and its material for expression. Krauss theorizes that these artists' expressions must be worked through "an object-state, separate from the artist's own being, through which his intentions must pass," like the pigment bearing substances of painting and the matter through space of sculpture: a material for expression that is the artist enmeshed in the media apparatus… a psychological state as material. She defines the crucial element of the looping electric video-circuit images of Acconci and Campus as the instantaneity of the communication from notion to message: "This is why it seems inappropriate to speak of a physical medium in relation to video. For the object (the electronic equipment and its capabilities) has become merely an appurtenance. And instead, video's real medium is a psychological situation, the very terms of which are to withdraw attention from an external object—an Other—and invest it in the Self." The object is bracketed out, and instead the artist is creating within a psychological state invoked by the mapping of the mind onto this network; the medium becomes the nervous system.

In her analysis, self-gazing video art such as Vito Acconci's long-take videos are, for the spectator, like viewing an electronic and psychological loop between the artist, camera, and screen. Krauss differentiates the video works: installations like Campus' *Dor* which install the narcissistic circuit within the gallery, and works like Vito Acconci's *Centers* (a looping pre-recorded video in which Acconci, watching himself in his live video monitor, repeatedly points at the center of the screen, coincidentally at the viewer and the focal point of the art work) which use the narcissistic circuit as a stage for performance that is then played back in the gallery. One

is documentation of an apparatus, and the other is an installation of apparatus in which the viewer is immersed. These video art works sought to reveal and emphasize the contemporary technological apparatus. The viewer's or artist's perception and the technical construction are identical. In the fashion of the Baudry diagram, we could draw the video art apparatus like I have in Fig. 13.2.
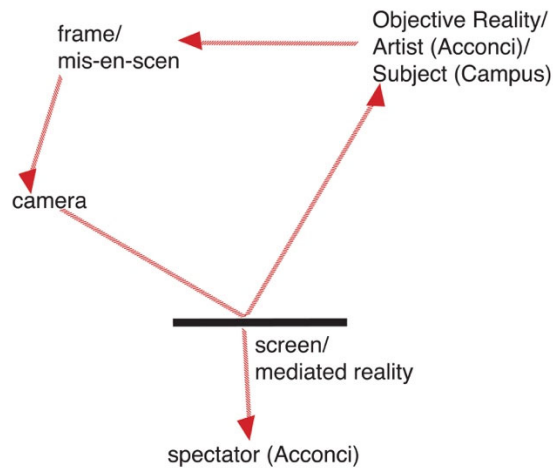

Fig. 13.2 Video Art Apparatus as described by Krauss

There is no need for dotted lines in the diagram to show an alternate, ideological perception because the perception of the viewer travels the same route as the wires. Both types of works cited by Krauss are loops, one presented as an object in the gallery, the other actually installed so that it can be stepped within (and frustrated in the case of Campus' *Dor*). In *Dor*, the viewer's perception should grasp equally the presence of the screen and the camera and the wire between them; that is the point. In Acconci's *Centers*, the viewer is to be aware of Acconci watching both the camera and the screen attached to it and performing within that circuit. In both works, the frame of the camera is the context of the conceptual statement— the framed square of the gallery art object for Acconci, the frame that separates the narcissistic projection from reality for Campus.

It is a surprisingly innocent diagram, where every trick is there to be revealed. Though augmented reality uses cameras streaming live to screens in a similar way, its construction is more complicated and there are areas of the apparatus that are repressed in the audience's perception.

13.4. Augmented Reality

Media Art, as the media philosopher Lars Qvortrup has noted, could all be described as ready-mades where instead of R. Mutt's urinal there is now a computer, a projector, a screen, a camera… (Qvortrup 2004). AR art has complicated this ready-made; it is an art of apparatus where the objects are plugged in to each other, broadcasting to each other live. It is an art of circuits.

Ronald T. Azuma in an early 1997 survey of the augmented reality medium drew the diagram I have redrawn in Fig. 13.3. The similarity to Baudry's 1970 diagram of the cinema apparatus is obvious; all that is missing is the dotted line of perception: what the spectator expects and ignores. In place of cinema's manipulation of live objects through scripting, set design, dramatic direction, here there is a direct live stream from the camera— the mediated-reality that is being augmented. In place of the screen there is the monitor or AR glasses (an invisible immersive screen that is not framed within a theatre but *is* the theater enveloping the spectator). In place of cinema montage is the "scene generator" that creates the augmentations (those virtual things not present in the live video capture). And in place of the cinema projector there is a "combiner" that renders together the augmentation and the mediated-reality of the video stream.
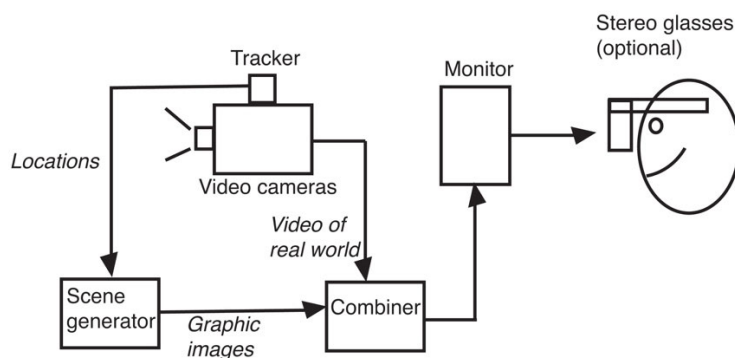

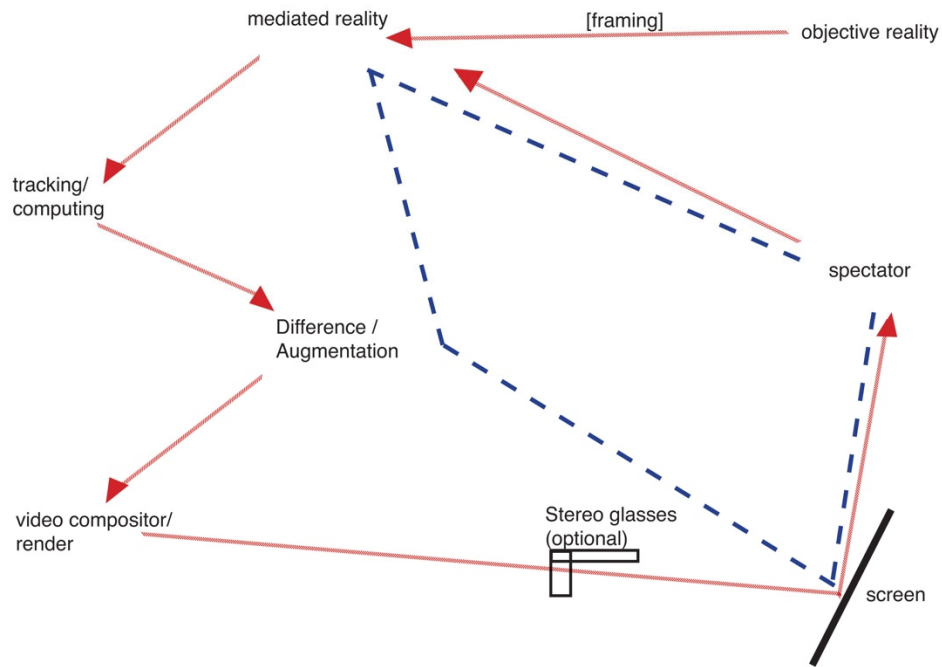**Fig. 13.3** Monitor-based AR conceptual diagram (Azuma 1997)

Fig. 13.4 Augmented Reality Apparatus (Azuma's diagram redrawn after Baudry)

After the style of Baudry, we could redraw Azuma's diagram like I have in Fig. 13.4. Here, again, the solid line draws the path of actual AR information from the objective reality captured by the live video camera, run through a tracking process, augmented with special processing and graphics, then rendered out to a screen or AR goggles (I note goggles off to the left of "screen" to denote how goggles are an 'invisible screen' that envelops the viewer). If the augmented reality experience is a 'magic mirror', like many AR filters and lenses, then the "objective reality" and "spectator" would coincide. "Tracking" could include face, pose, and image recognition, as well as arbitrary tracking and geo-location that place virtual-objects within the environment.

The dotted line draws the normal spectator perception. Unlike Baudry's diagram of cinema, this describes the audience as aware of the screen as manipulated media. They are much farther away from the cinematic illusion of witnessing real faces and camels. The spectator is conscious of watching a "mediated reality" and not a simple reflection of objective reality. In cinema effects, digital computation and compositing are used to create a simulacrum of reality (real looking dinosaurs attack the real flesh-and-blood actors that appear on the screen), augmented reality plays with the combination of the evidently unreal and the real. It's essence and raison d'être is that juxtaposition and border between two epistemologically diverse universes, the live mediation and the virtual augmentation, and that border is evident. AR doesn't attempt to embed the viewer in an objective reality, instead the spectator identifies with a mediation— the mediation that *stands-in for* reality.

Besides the repression of objective reality, in the audience's perception the computational processes of augmentation are also repressed. The audience is aware of the augmentation being done—such as the addition of graphics, animations, models, or other filters on the video stream— but are largely unconscious of the actual computational processing being done to the video: any severe tracking issues such as jitter in the augmentation, or render issues such as bad aliasing would be considered a failure of the medium and would 'take us out' of the experience.
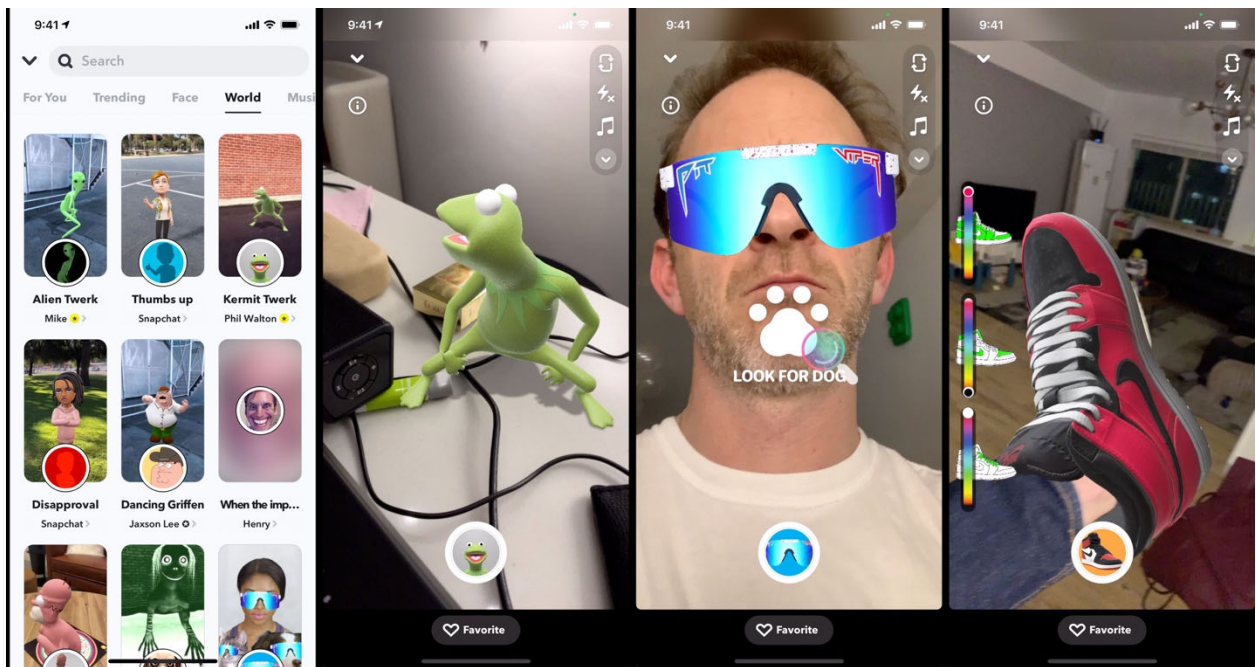
13.5 ARt

Fig. 13.5 A list of popular augmented reality 'lenses' within the iPhone Snapchat app (left). Three selections in action: *Kermit Twerk* by Phil Watson (center-left) which uses arbitrary tracking, *Pit Viper* by Chelsea Calvi (center-right) which uses facial recognition, and *Custom Jordans* by Objectspace (right) which uses pose/body recognition (screen-captures by the author in March 2021).

Fig. 13.6 AR art using printed fiducials: 52*card Psycho* (G.A.Rhodes 2009). A custom deck of 52 cards, each printed with a unique fiducial marker, is recognized and tracked by special software; in the video feed each card is replaced with one of the 52 shots which make up the shower scene in Alfred Hitchcock's 1960 film, *Psycho*.

So, what would be an avant-garde AR art?

Industry has offered AR experiences for commercial purposes such as Google Glass and Microsoft HoloLense, and realized popular AR experiences like Pokémon Go, selfie AR beauty apps, SnapChat Lenses and Instagram AR Filters (Fig. 13.5). AR art is challenged to stake out territory outside these established paradigms. An avant-garde AR art will expose and utilize the structures repressed in industry production to create experiences that deconstruct our contemporary relationship to reality, virtuality, and processing.

Returning to our diagram of AR perception, we can seek out ripe areas where standard AR production is designed to repress the apparatus. The areas noted on the left of the diagram, "tracking / computing" and "video compositor / render," have been used in AR art for their expressive potential. Similar to 'glitch art', early AR art used fiducial markers— barcode-like patterns used for image tracking and robot-vision— as both a graphical key for tracking and a visible emblem of computer vision (Fig. 13.6). The fiducial pattern reveals the apparatus— a code which only the tracker and scene-generator can read— and exposes the obscurity of the computational process instead of hiding it. We can ask what other internal processes of AR are manifested in objective reality. Are there other technological remainders or excesses in the state of the art, that could take a similar role as fiducials?

In the diagram, the repression of "objective reality" in favor of "mediated reality" also offers an opportunity for deconstruction. Science fiction, such as *Black Mirror* (2011- 2019), has sought through fictional narratives to expose the blithe repression of reality implicit in the AR experience and the implications for social justice that come with reality being subservient to a

mediated AR perception. Utopian visions of AR, like the 2012 *Google Project Glass: Official Concept Walkthrough Video, 'One Day'*, gloss over the messy reality of living, as if objective reality will lay down and be a passive screen for augmentation. Can a genre of AR art be imagined that ruptures this brittle exterior of mediation? Contemporary life and contemporary audiences—with all our screens and media distractions— would respond to an art that reveals the intricate contradictions of desire and value, reality and virtual in which we participate.

Augmented Reality, in all its permutations of live manipulated media, is the first truly network-age screen media—not just movies broadcast over electric wires, or recorded on to digital media, or enhanced through computer-calculated effects, but a medium which takes live media manipulation as its essence and material.   Live mediation is the 'reality' in augmented reality, and increasingly it is our own reality. This suppression of the real in AR seems fertile ground in which to explore our contemporary relationship with networked media. Today,our virtual presence and lives are made in relationship with machines that see before we see, read our digital codes and cookies and histories that we cannot know, then compile and render out their own selections of pixels and images… all without us seeing the process. Future AR art will question how to make mediation *not* seem real— and challenge our relationship to the computational machine.

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