

Constantin Basica

Chord Optimization in Music Composition: Towards a Machine-Inspired Technique for Human-Based Performance

experimental theatre for ten performers, composer, electronics,
live 360° video, and multichannel video

2018

High-quality video documentation of the premiere given by *Mocrep*
is available under the following links:

<http://dma.constantinbasica.com/coimctamitfhbp.html>

<https://youtu.be/f1ATsf1NLQ4>

To obtain the audio/video materials and the files needed in performance
please contact the composer:

email@constantinbasica.com
cobasica@ccrma.stanford.edu

REQUIREMENTS

Composer

If the composer is not available for performance, a substitute must take his role. The substitute can be a male or female performer. In this case, the eight *Video-Interviews* must be produced again.

Props

- 11 chairs
- 1 bowl with chocolate
- 2 paper reams
- 4 large brooms
- Additional props for recording the video in *Movement IV*:
 - 1 remote-controlled toy robot
 - 1 remote-controlled robotic arm
 - 1 small knife
 - 2 electric screwdrivers and other tools (e.g., hammers)
 - 2 tennis racquets, 2 ping-pong paddles, and 2 pool cues

Technology

HARDWARE

- 1 computer with 2 video outputs (for the *Main* and *Floor* videos)
- 1 computer for the *Video-Interviews*
- 1 computer for audio
- 10 XLR cables (50ft each)
- 10 headphones
- 10 smartphones with cameras (for *Movement II*)
- 1 360° camera (for *Movement III*)
- 1 camera (for recording *Movement IV*)
- 1 audio interface with 10 inputs and 14 outputs
- 10 dynamic microphones
- 4 speakers
- 3 projectors
- 1 large projection screen (*Main* video)
- 1 small or medium projection screen (*Video-Interviews*)

SOFTWARE

- Cycling '74 Max installed on video computer(s)
- Ableton Live installed on audio computer
- Max Patches, Live Set, audio and video files
(email@constantinbasica.com / cobasica@ccrma.stanford.edu)
- 3D scanning application (e.g., Skanect)
- 360° streaming application
- Syphon/Spout

Instrumental Intro

Interlude 1

Movement I

Interlude 2

Movement II

Interlude 3

Movement III

Interlude 4

Movement 4

Interlude 5

Instrumental Outro

COMPOSER'S TEXT

After Instrumental Intro (memorized)

Thank you! Thank you all very much! This proved to be indeed a great undertaking, so I want to thank you all for your patience! And, of course, thanks to the performers for all their hard work! Let's give them another round of applause! I hope you enjoyed experiencing this process and that it is clear now how the machine-inspired technique allowed us to reach what could probably be described as the most efficient chord in my music so far... For those of you who are still not tired, I invite you to join me after the concert, here in the same space, I will do a short interview on issues related to AI and how I adapted the Reinforcement Learning method. Again, thank you all and have a nice evening!

Before Instrumental Outro (memorized or read)

Good evening everyone! Thank you all for coming out, it's great to see so many familiar faces! I would just like to say a few things before we begin. The technique that we're about to present tonight is based loosely—and I want to stress the word loosely—on Artificial Intelligence (or AI). More precisely, the performance borrows a technique that is currently used to train AI systems to become better at things, such as recognizing faces or voices, and, in our case, it will optimize chords in music composition and human-based performance. So, what I decided to do for my piece was to apply a technique called reinforcement learning to an instrumental ensemble. The idea is very simple. My piece has not been composed, yet, I don't know exactly how it will sound, nor does the system receive specific instructions about what they should play, and their goal is to achieve the best sounding chord possible at the end of the process. So, the performers' strategy will be to randomly choose a musical action based on the likelihood of occurrence in this context and then update their musical parameters based on rewards that I—as the brain of this organic system—impart on those components of the system—the performers—who achieve satisfactory results. The reward will come in the form of chocolate. In addition, our system is also employing face recognition: the performers watch my face, analyze it and extract facial features, then, based on the specific pattern of facial expressions, they decide for themselves if they should maintain, amplify, or dismiss certain musical parameters. Now, I will have to warn you that this is quite a lengthy process, since I am still experimenting with different versions of the system, so your patience will be tested, because it requires many iterations of trial and reward, until all the performers learn for themselves what the best chords for my piece are. So, this might take a few hours—it's hard to estimate with the current computational power of the human brain—so... sit tight, go to the bathroom if you need to, and I invite you to join us in finding the ultimate chord! Please welcome the performers!

INSTRUMENTAL INTRO/OUTRO

Instrumental Intro

Performers: sit in a semicircle and face the audience. Choose an instrument that you can play or use your voice. Play/sing a loud, sustained pitch for approximately 15 seconds.

Composer: sit in the middle and face the ensemble. Signal the ending of the chord for the performers. Afterwards, stand up and perform the actions associated with the ending of a concert (bow to the audience, point to the performers, etc.). During the audience's applause, speak the text *After Instrumental Intro*.

Instrumental Outro

The stage arrangement should be identical to the one in the *Instrumental Intro*.

Performers: sit in the same position in the semicircle. Use the same instrument (or your voice) from *Instrumental Intro*. Upon the composer's signal, begin to play/sing. Improvise with short, repeated figures. Try to catch the composer's attention by playing/singing something different than the other performers. If you receive a reward (chocolate), eat it and then continue the last figure but develop it. If the composer does not seem interested in your improvisation, change to a different figure. As the light fades out, match your playing/singing dynamic to it by performing a long diminuendo.

Composer: after you finish speaking the text *Before Instrumental Outro*, sit down on the chair. Signal the performers to begin. Listen to their improvisation. When you hear a musical figure that you like, reward that specific performer with a piece of chocolate (put it in their mouth), then go back to the chair and repeat the process..

Lighting: a two-minute fade-out starts when the performers begin to play.

INTERLUDES

Interlude 1

(10): During composer's speech, take out the chairs and the chocolate bowl, then pick up the XLR cables from the floor and move to your stations for Movement I.

Interlude 2

Crawl to your stations from Movement I, pick up your cables and stand up.

(9): Go to the grid for Movement 2. Put cables on the floor and start recoiling them. Once done, put your cable on the right shoulder and hold with right hand.

(Performer 10): When the other 9 performers are in the grid, go off stage and pick up the smartphones. Bring them to the stage and distribute them among the 9.

Interlude 3

(6): Pick up your cables from the floor and move to the circle formation around the 360° camera. Uncoil the cables and wrap them around your feet and hands, leaving enough slack to perform with in Movement III.

(2): Once the other 6 performers are ready, take the cable connectors and connect the six cables together.

(2): Remain "dead" on the floor.

Interlude 4

Coil the cables and take them out of the stage.

(6): bring the sheets of paper and gradually throw them on the floor.

(4): bring the brooms and start sweeping the paper to the middle of the stage.

Interlude 5

(10): Sweep all the paper under the projection screen. Spread out the cables on the stage. Bring the chairs back and put them in the semicircle formation. Put the composer's chair and chocolate bowl in the middle.

MOVEMENT I

The parts need to be memorized, because there is continuous movement throughout the Movement, which requires your entire body. I'm sorry that I'm asking you to memorize yet another part of the piece, but I hope that the iterative structure in each part will make sense and ease the process.

I have included a clicktrack in the video for each performer. The timing of the movement between positions in the video is "ideal", since it's based on the score and clicktrack. You can use your individual videos to practice your parts, but, obviously, there will be drifts from this ideal situation in the performance, since you won't have a clicktrack, so it's virtually impossible to keep each the tempo steady, while also vocalizing, moving on stage, and performing actions. So, what I'm saying is that you don't have to worry in the performance if things don't fall perfectly into place—it's part of the concept: humans don't perform like machines. Hence, the "approx." in the tempo indication. You'll just have to adjust on the fly and move a little slower to each Position, depending on whether it's already been vacated by the other performer. However, I think it would be good if you could practice with your videos/clicktracks independently, before we put it together, because the hope is that you'll get as close as humanly possible to the ideal version.

The 16 positions will be marked subtly on the floor with tape.

All performers face the following points when performing the 4 actions:

- East: Games
 - South (to audience): Military
 - West: Instruments
 - North: Ballet
-

BODY (miming)

Sweeping the floor: pretend to sweep the floor with a broom. Use both of your hands, as if holding the broom and pushing dirt forward. Each symbol is one full sweep. Repeat the movement more or less the same. All 10 Performers should do a similar sweeping movement.

Morphing: keeping the sweeping tempo, morph between the two states of sweeping and action. Each X in the part represents a movement towards the second state (game/instrument) and backwards to sweeping, but with each pair of X, get closer to the second state and fade the sweeping.

The following **Actions** are only performed the first time for each action, then only the associated sound remains as you continue to sweep.

Games:

If you have never played your assigned game, please watch some videos and attempt to mime the action as accurately as possible.

- 1: Baseball - swing and hit
- 2: Ping-Pong - backhand hit
- 3: Volleyball - digging with hands
- 4: Badminton - serve
- 5: Tennis - forehand hit
- 6: Pool - prepare and hit
- 7: (Field) Hockey - swing and hit
- 8: Golf - swing and hit
- 9: American Football - pass the ball
- 10: Basketball - prepare and jump

Military:

Jump in place, body straight, just as if you were a soldier answering to your superior.

Instruments:

Pretend to play a sustained note or glissando in a Romantic playing style.

Ballet:

Make a ballet pose (choose your own, not the same as the others).

SOUNDS

Each time a sound returns, it should be exactly the same. Each performer should do a slightly different grunt/shout/whistle/yawn.

Games: make a grunt as you swing/hit/jump.

Military: shout as loudly as possible.

Instruments: whistle upwards.

Ballet: yawn (downwards) as being tired/bored.

Repeat until cue:

All 10 performers loop their vocal part (in diminuendo) and keep sweeping (turning clockwise in place). Listen to the video, which will have started a little while ago. Immediately after the cue (*killing people*), each of you will perform a "death grunt":

*Obviously, Artificial Intelligence doesn't have to be like the Terminator going around and killing people. -> **death grunt***

Death grunt: imitate the human killed by the Terminator in this video:

<https://www.youtube.com/watch?v=DXsyn-9VLVA>

Shout *Done!* when "impaled", then twitch a few times and fall on the floor.

After the death grunt, you fall on the floor and remain there until another cue in the video (we'll figure out the specific words during the residency).

PERFORMER 1

♩ = approx. 45

4x 3x

6

Voice

Body

4/4

4/4

Finish coiling the cable

Throw cable on the floor

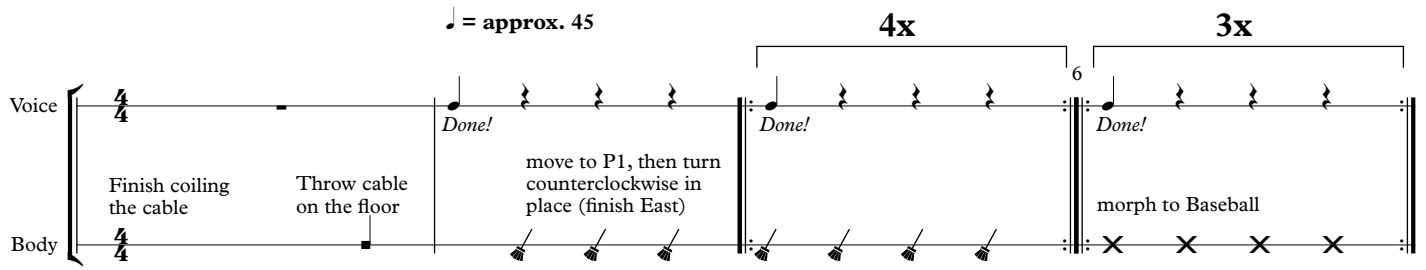
Done!

move to P1, then turn counterclockwise in place (finish East)

Done!

Done!

morph to Baseball



1a
(+ grunt)

1b

9

V.

B.

Done!

[grunt]

Done!

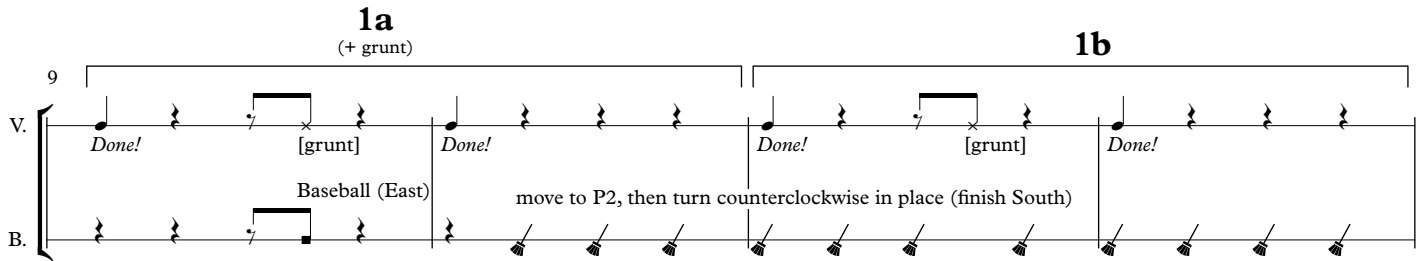
Done!

[grunt]

Done!

Baseball (East)

move to P2, then turn counterclockwise in place (finish South)



2
(+ aye)

13

V.

B.

Done!

[grunt]

Done!

Aye Aye Sir!

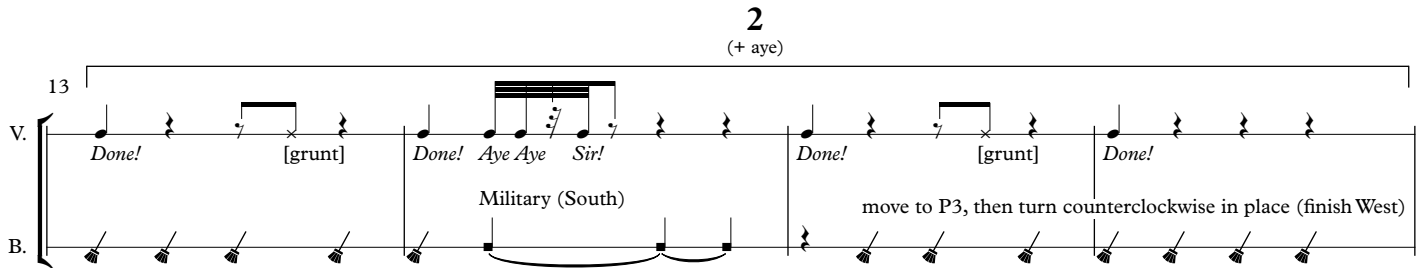
Done!

[grunt]

Done!

Military (South)

move to P3, then turn counterclockwise in place (finish West)



3
(+ whistle)

17

V.

B.

Done!

[grunt]

Done!

Aye Aye Sir!

Done!

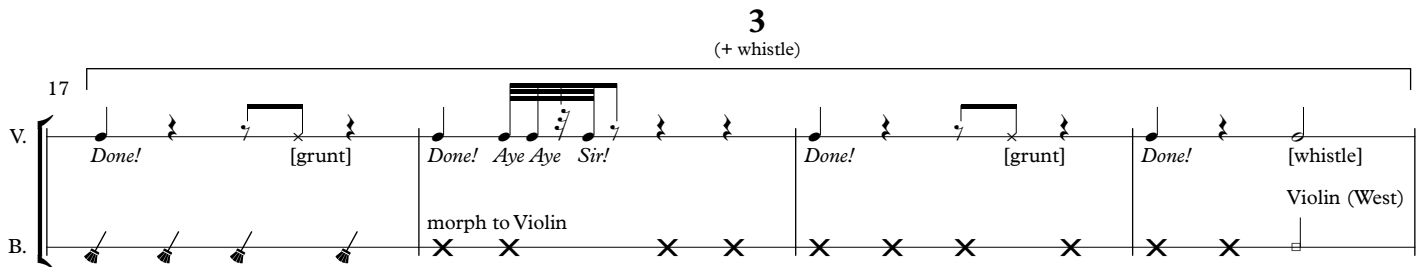
[grunt]

Done!

[whistle]

Violin (West)

morph to Violin



4
(+ yawn)

21

V.

B.

Done!

[grunt]

Done!

Aye Aye Sir!

[yawn]

Done!

[grunt]

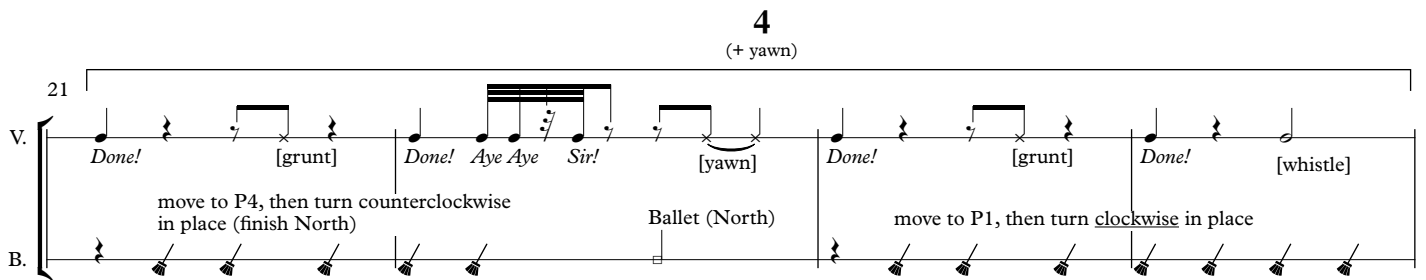
Done!

[whistle]

move to P4, then turn counterclockwise in place (finish North)

Ballet (North)

move to P1, then turn clockwise in place



repeat until cue
diminuendo poco a poco

25

V.

B.

Done!

[grunt]

Done!

Aye Aye Sir!

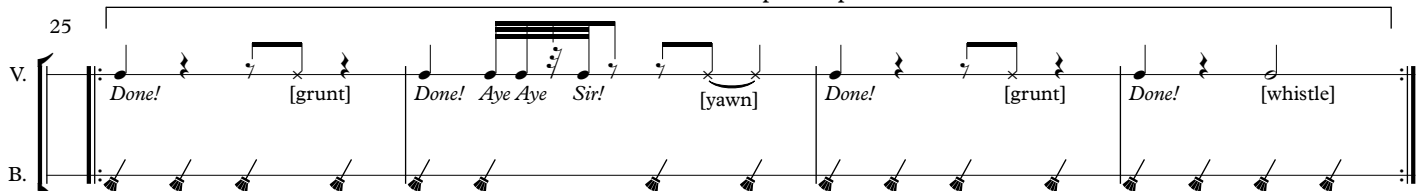
[yawn]

Done!

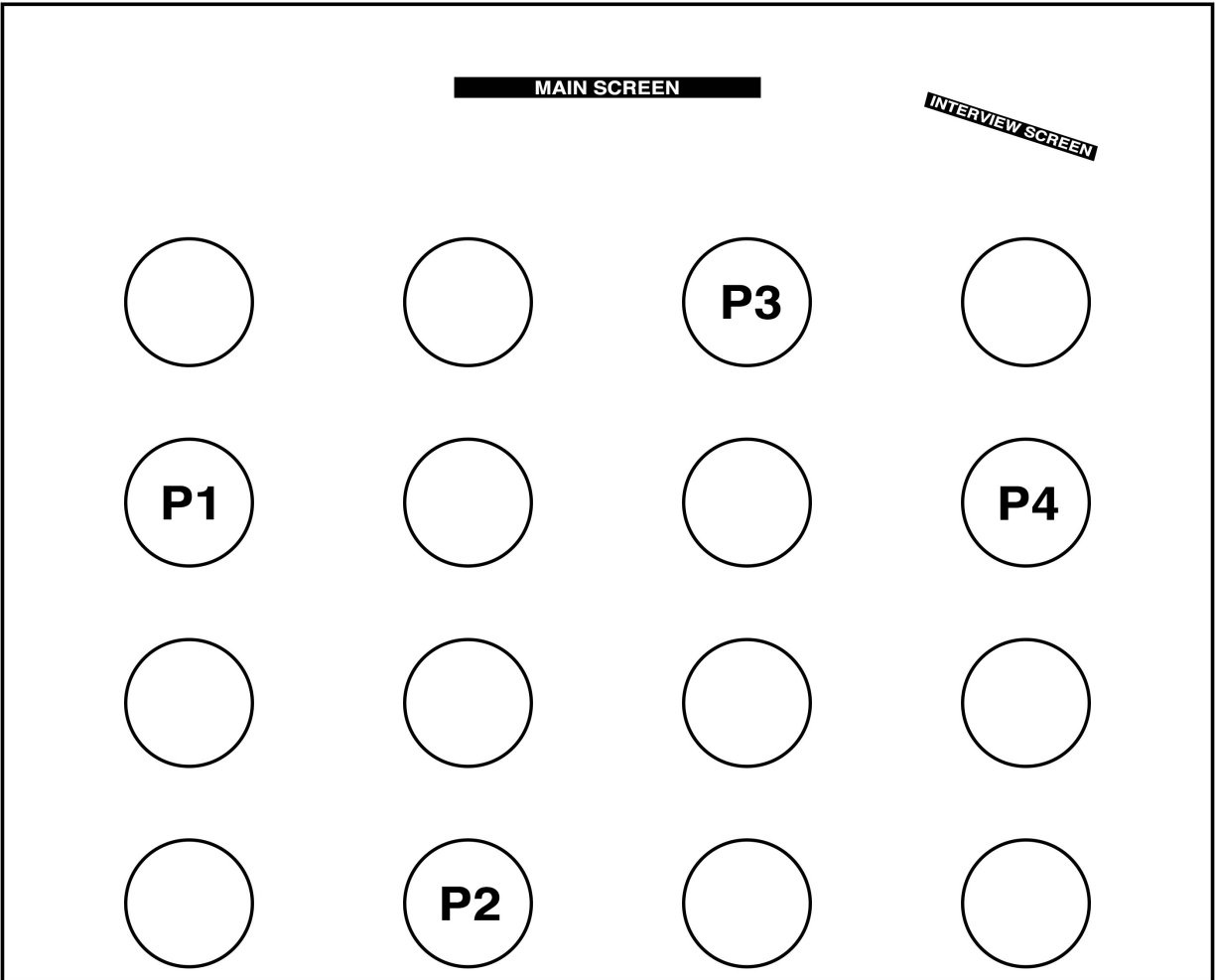
[grunt]

Done!

[whistle]



PERFORMER 1



Watch Performer 1 and set her/his tempo in your mind (based on sweeping).

♩ = approx. 45

Slightly faster than Performer 1 (♩ = approx. 60)

2x

3x

3x

Performer 1

Voice

Done!

Done!

Done!

Done!

Done!

Body

Finish coiling the cable

Throw cable on the floor

move to P1, then turn clockwise in place (finish East)

morph to Ping-Pong

1a (+ grunt)

1b

8

V.

Done!

[grunt]

Done!

Done!

Done!

B.

Ping-Pong (East)

move to P2, then turn clockwise in place (finish South)

2a (+ aye)

2b

12

V.

Done!

[grunt]

Done!

Aye Aye Ma'am!

Done!

[grunt]

Done!

Aye Aye Ma'am!

B.

Military (South)

move to P3, then turn clockwise in place (finish West)

2c

2d

16

V.

Done!

[grunt]

Done!

Aye Aye Ma'am!

Done!

[grunt]

Done!

Aye Aye Ma'am!

B.

morph to Flute

3a (+ whistle)

4a (+ yawn)

20

V.

Done!

[grunt]

[whistle]

Done!

Aye Aye Ma'am!

Done!

[grunt]

[whistle]

Done!

[yawn]

Aye Aye Ma'am!

B.

Flute (West)

move to P4, then turn clockwise in place (finish North)

Ballet (North)

4b

repeat until cue
diminuendo poco a poco

24

V.

Done!

[grunt]

[whistle]

Done!

[yawn]

Aye Aye Ma'am!

Done!

[grunt]

[whistle]

Done!

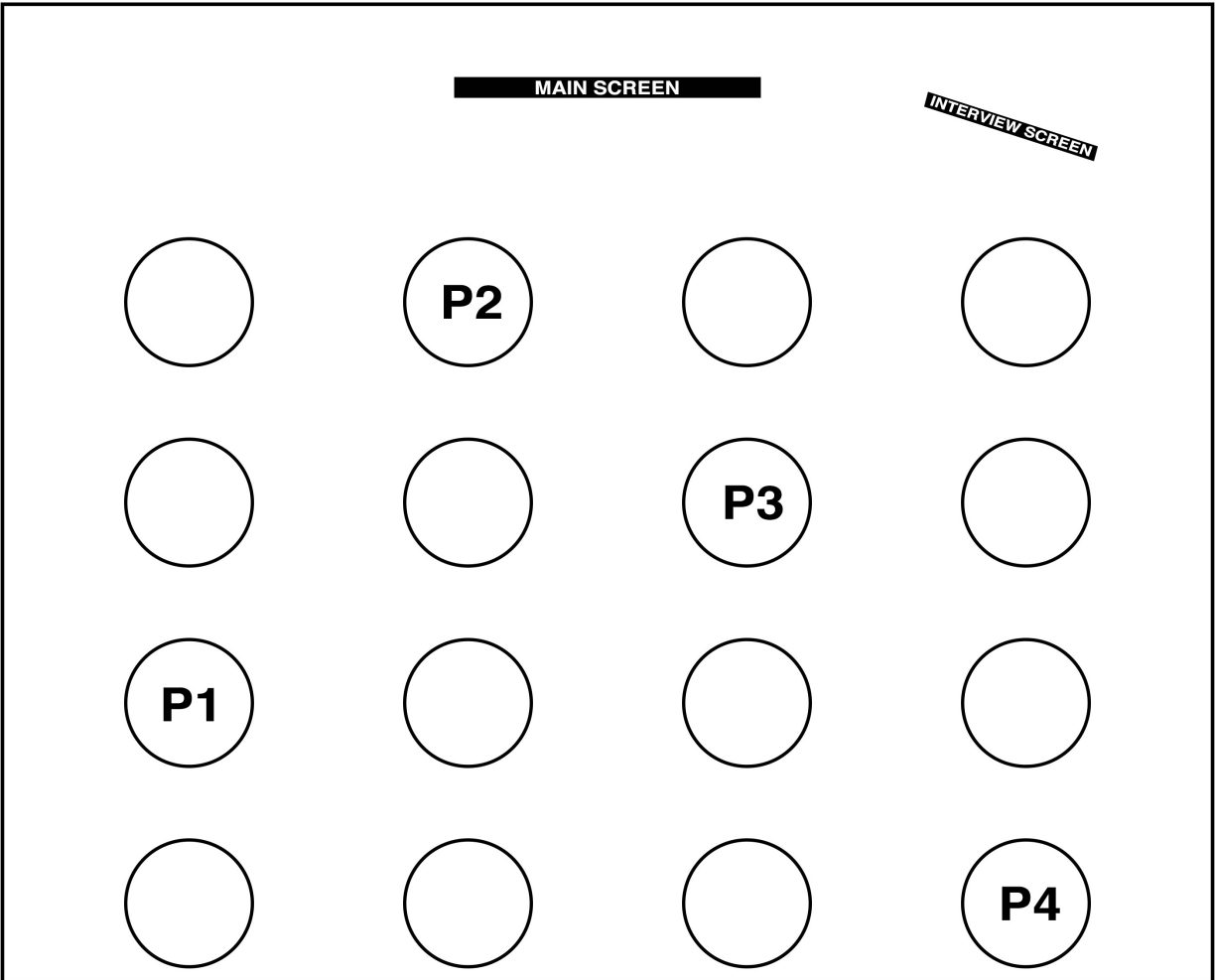
[yawn]

Aye Aye Ma'am!

B.

move to P5, then turn clockwise in place

PERFORMER 2



Watch Performer 1 and set her/his tempo in your mind (based on sweeping).

♩ = approx. 45

Slightly slower than Performer 1 (♩ = approx. 36)

3x

3x

Performer 1 3x

Voice: Done! Done! Done! Done! Done!

Body: Finish coiling the cable, Throw cable on the floor, move to P1, then turn counterclockwise in place (finish East), morph to Volleyball

1a

(+ grunt + A.I.)

8

V. Done! [grunt] Done! Done! Done! A. I. Sir!

B. Volleyball (East), move to P2, then turn counterclockwise in place (finish South), Military (South)

1b

12

V. Done! [grunt] Done! Done! Done! A. I. Sir!

B. move to P3, then turn counterclockwise in place (finish West), morph to Trumpet

2

(+ whistle)

16

V. Done! [grunt] Done! Done! [whistle] Done! A. I. Sir!

B. Trumpet (West), move to P4, then turn counterclockwise in place (finish North)

3

(+ yawn)

20

V. Done! [grunt] Done! [yawn] Done! [whistle] Done! A. I. Sir!

B. Ballet (North), move to P5, then turn clockwise in place

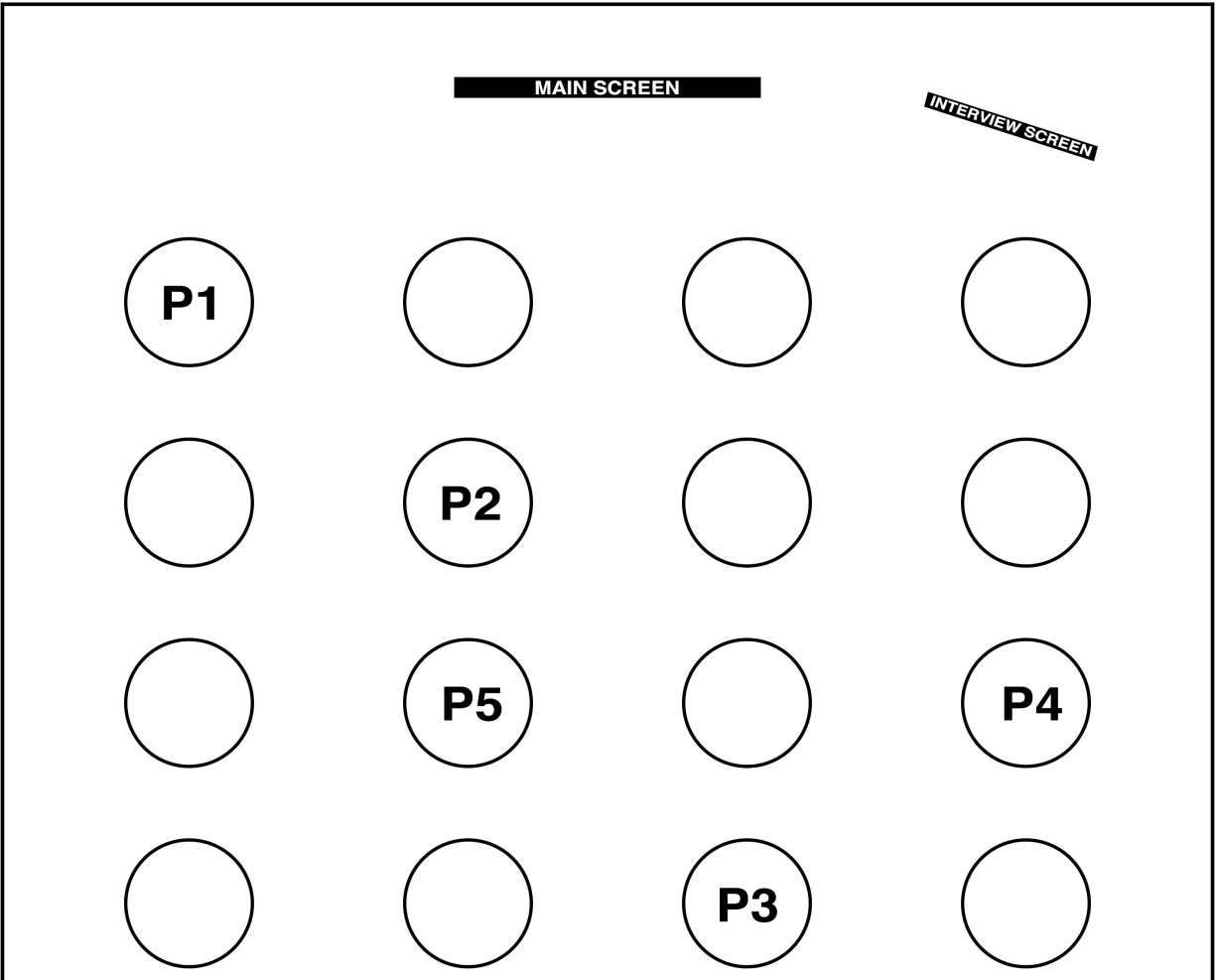
repeat until cue
diminuendo poco a poco

24

V. Done! [grunt] Done! [yawn] Done! [whistle] Done! A. I. Sir!

B. (repeated body actions)

PERFORMER 3



Watch Performer 1 and set her/his tempo in your mind (based on sweeping).

♩ = approx. 45
 Performer 1 3x

Slower than Performer 1
 ♩ = approx. 36

2x

2x

Voice: Done! Done! Done! Done! Done!

Body: Finish coiling the cable, Throw cable on the floor, move to P1, then turn clockwise in place (finish East), morph to Badminton

1 (+ grunt)

V. Done! [grunt] Done! Done! Done!

B. Badminton (East), throw, hit, move to P2, then turn clockwise in place (finish South)

2 (+ A.I.)

V. Done! [grunt] Done! Done! A. I. Ma'am! Done!

B. Military (South), move to P3,

3 (+ whistle)

V. Done! [grunt] Done! Done! A. I. Ma'am! Done! [whistle]

B. then turn clockwise in place (finish West), morph to French Horn, French Horn (West)

4 (+ yawn) diminuendo poco a poco

V. Done! [grunt] Done! [yawn] Done! A. I. Ma'am! Done! [whistle]

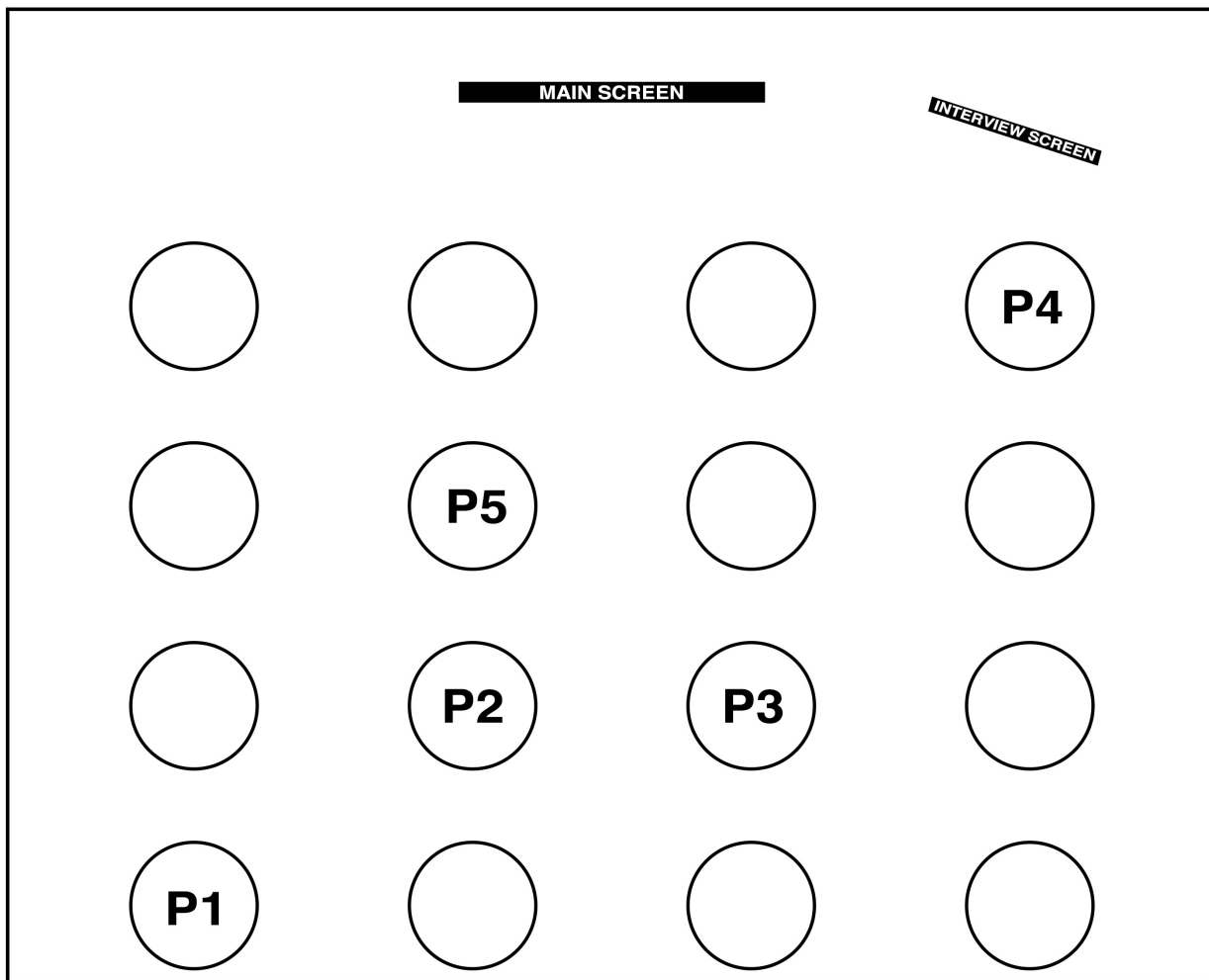
B. move quickly to P4, Ballet (North), move to P5, then turn clockwise in place

repeat until cue

V. Done! [grunt] Done! [yawn] Done! A. I. Ma'am! Done! [whistle]

B.

PERFORMER 4



Watch Performer 1 and set her/his tempo in your mind (based on sweeping).

♩ = approx. 45

A little faster than Performer 1 (♩ = approx. 68)

Performer 1 **6x**

Voice: Done! Done! Done! Done!

Body: Finish coiling the cable

Throw cable on the floor

move to P1, then turn counterclockwise in place (finish West)

2x

2x

V. Done! Done! Done!

B. morph to Cello

[whistle]

Cello (West)

1 (+ whistle)

move to P2, then turn counterclockwise in place (finish North)

2a (+ yawn)

V. Done! Done! Done!

B. Ballet (North)

[whistle]

[yawn]

2b

V. Done! Done! Done!

B. move to P3, then turn counterclockwise in place (finish West)

[whistle]

[yawn]

3 (+ grunt)

V. Done! Done! Done!

B. morph to Tennis

Tennis (East)

[grunt]

[yawn]

4 (+ aye)

V. Done! Done! Done!

B. move to P4, then turn counterclockwise in place (finish South)

Military (South)

move to P5, then turn clockwise in place

[whistle]

Aye Aye Ma'am!

[grunt]

[yawn]

repeat until cue
diminuendo poco a poco

20

V. Done! Done! Done!

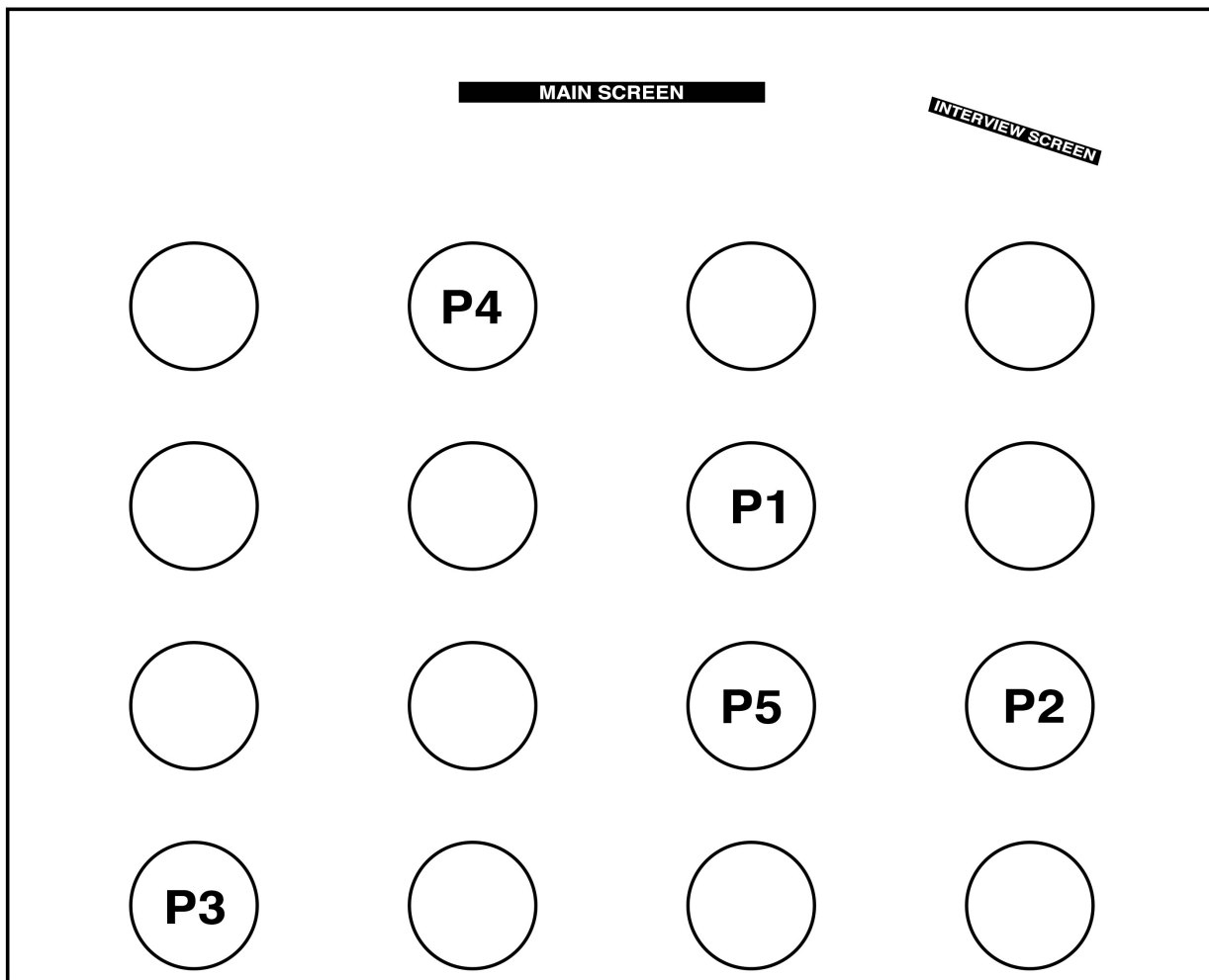
B. Aye Aye Ma'am!

[whistle]

[grunt]

[yawn]

PERFORMER 5



Watch Performer 2 and set her/his tempo in your mind (based on sweeping).

♩ = approx. 60

♩ = approx. 60

3x

3x

Performer 2

7x

Voice: Done! Done! [grunt] Done! Done! Done! Done!

Body: Finish coiling the cable Throw cable on the floor move to P1, then turn clockwise in place (finish West) morph to Guitar

1a

(+ whistle)

1b

8

V. Done! [whistle] Done! Done! [whistle] Done!

B. Guitar (West) move to P2, then turn clockwise in place (finish North)

2a

(+ yawn)

2b

12

V. Done! [whistle] Done! [yawn] Done! [whistle] Done! [yawn]

B. Ballet (North) move to P3, then turn clockwise in place (finish East)

2c

2d

16

V. Done! [whistle] Done! [yawn] Done! [whistle] Done! [yawn]

B. morph to Pool

diminuendo poco a poco

3a

(+ whistle)

4a

(+ A. I.)

20

V. Done! [grunt] [whistle] Done! [yawn] Done! [grunt] [whistle] Done! [yawn] A. I. Ma'am!

B. Pool (East) move to P4, then turn clockwise in place (finish South) Military (South)

4b

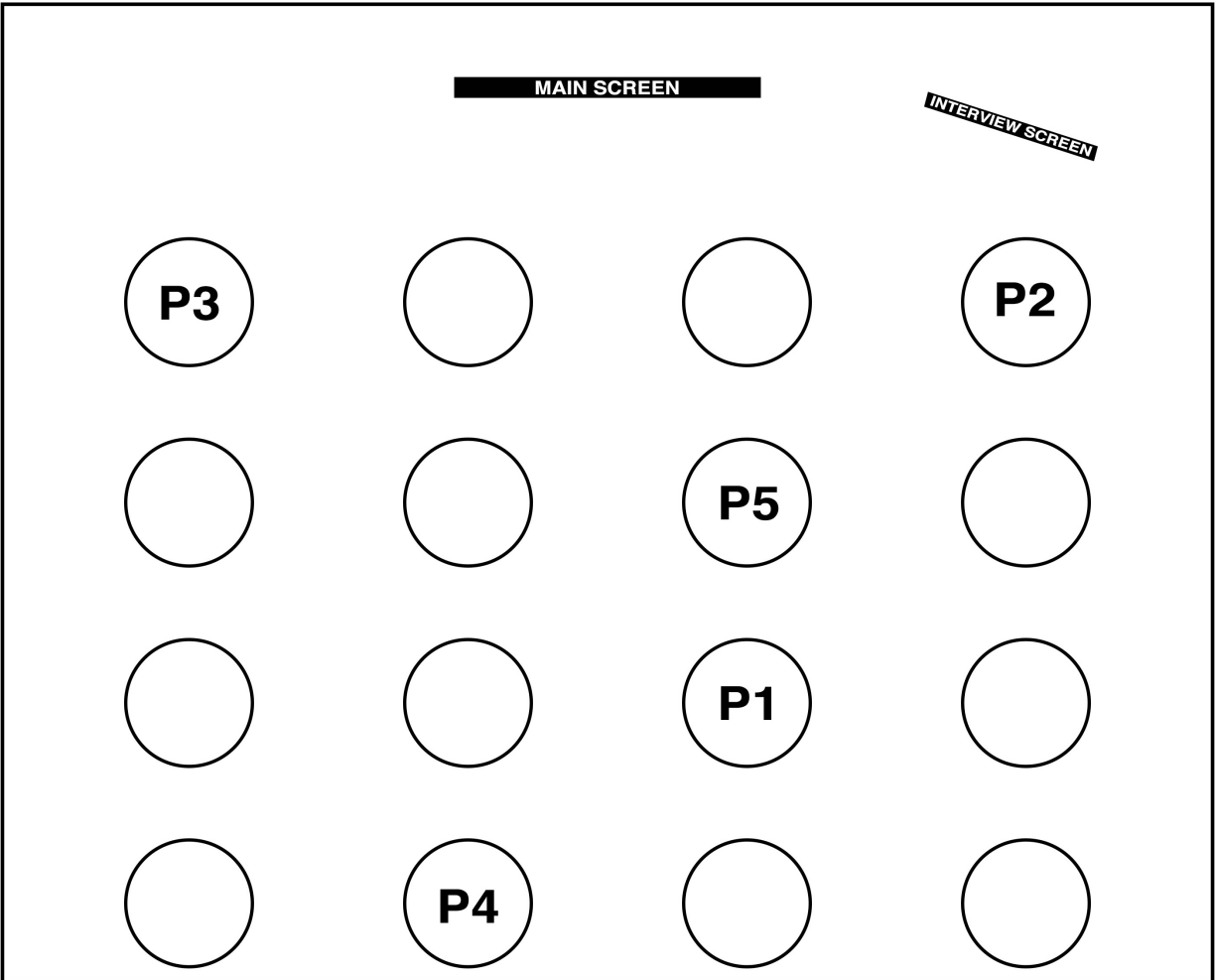
repeat until cue

24

V. Done! [grunt] [whistle] Done! [yawn] A. I. Ma'am! Done! [grunt] [whistle] Done! [yawn] A. I. Ma'am!

B. move to P1, then turn clockwise in place

PERFORMER 6



Watch Performer 3 and set her/his tempo in your mind (based on sweeping).

♩ = approx. 36

(♩ = approx. 36)

3x

3x

Performer 3 **6x** Performer 3

Voice: Done! Done! Done! Done! Done!

Body: Finish coiling the cable
Throw cable on the floor
move to P1, then turn counterclockwise in place (finish East)
morph to Hockey

1a

(+ grunt + aye)

8

V. Done! [grunt] Done! Done! Done! Aye Aye Sir!

B. Hockey (East) move to P2, then turn counterclockwise in place (finish South) Military (South)

1b

12

V. Done! [grunt] Done! Done! Done! A. Aye Aye Sir!

B. move to P3, then turn counterclockwise in place (finish West) morph to Clarinet

2

(+ whistle)

16

V. Done! [grunt] Done! Done! [whistle] Done! Aye Aye Sir!

B. Clarinet (West) move to P4, then turn counterclockwise in place (finish North)

diminuendo poco a poco

3

(+ yawn)

20

V. Done! [grunt] Done! [yawn] Done! [whistle] Done! Aye Aye Sir!

B. Ballet (North) move to P5, then turn clockwise in place

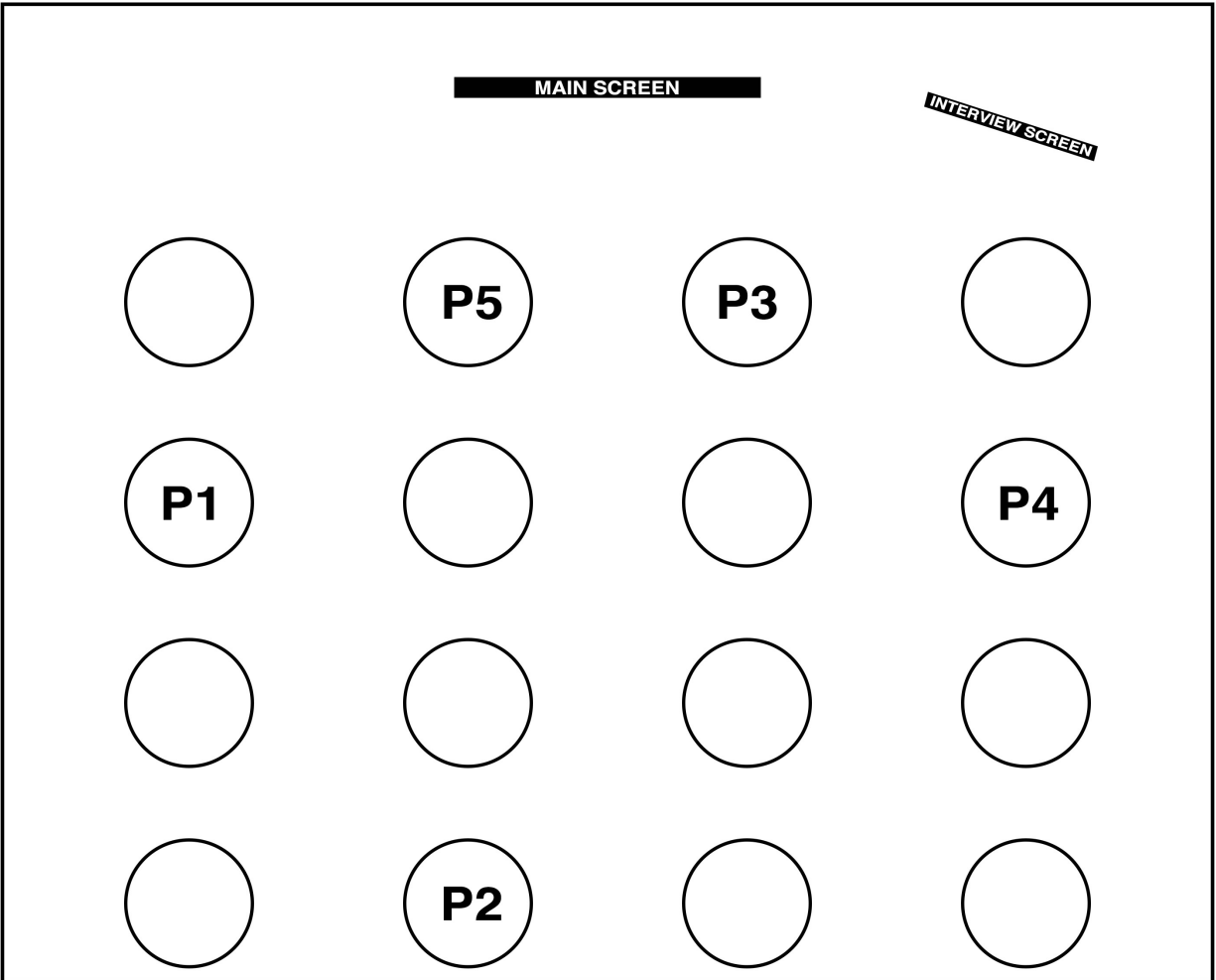
repeat until cue

24

V. Done! [grunt] Done! [yawn] Done! [whistle] Done! Aye Aye Sir!

B.

PERFORMER 7



Watch Performer 4 and set her/his tempo in your mind (based on sweeping).

♩ = approx. 36
 Performer 4 4x

(♩ = approx. 36)

2x

2x

Voice: Done! Done! Done! Done! Done!

Body: Finish coiling the cable, Throw cable on the floor, move to P1, then turn clockwise in place (finish East), morph to Golf

1
(+ grunt)

V. Done! [grunt] Done! Done! Done!

B. Golf (East), move to P2, then turn clockwise in place (finish South)

2
(+ A.I.)

V. Done! [grunt] Done! Done! A. I. Ma'am! Done!

B. Military (South), move to P3,

3
(+ whistle)

V. Done! [grunt] Done! Done! A. I. Ma'am! Done! [whistle]

B. then turn clockwise in place (finish West), morph to Double Bass, Double Bass (West)

4 *diminuendo poco a poco*
(+ yawn)

V. Done! [grunt] Done! [yawn] Done! A. I. Ma'am! Done! [whistle]

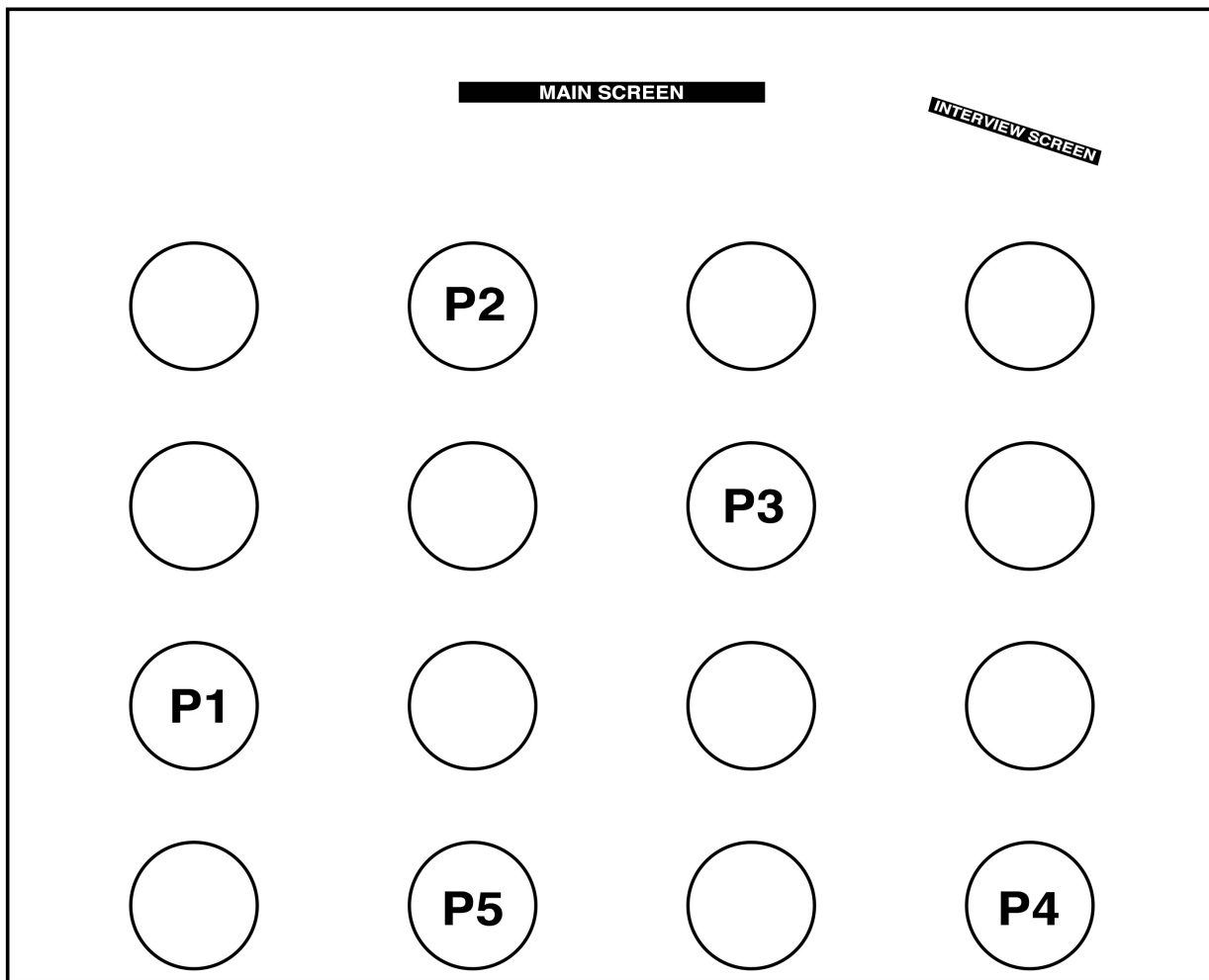
B. move quickly to P4, Ballet (North), move to P5, then turn clockwise in place

repeat until cue

V. Done! [grunt] Done! [yawn] Done! A. I. Ma'am! Done! [whistle]

B.

PERFORMER 8



Watch Performer 5 and set her/his tempo in your mind (based on sweeping).

♪ = approx. 68

Together with Performer 10
(♩ = approx. 68)

Performer 5 **5x**

Voice: Done! Done! Done! Done!

Body: Finish coiling the cable

Throw cable on the floor

move to P1, then turn counterclockwise in place (finish East)

2x

4

V. Done! Done! [grunt] Done!

B. morph to Football

Football (East)

move to P2, then turn counterclockwise in place (finish South)

1
(+ grunt)

2a
(+ aye)

V. Done! [grunt] Done! Done! Aye Aye Sir!

B. Military (South)

2b

V. Done! [grunt] Done! Done! Aye Aye Sir!

B. move to P3, then turn counterclockwise in place (finish West)

3
(+ whistle)

V. Done! [grunt] Done! Done! [whistle] Aye Aye Sir!

B. morph to Bassoon

Bassoon (West)

4
(+ yawn)

diminuendo poco a poco

V. Done! [grunt] Done! [yawn] Done! [whistle] Aye Aye Sir!

B. move to P4, then turn counterclockwise in place (finish North)

Ballet (North)

move to P5, then turn clockwise in place

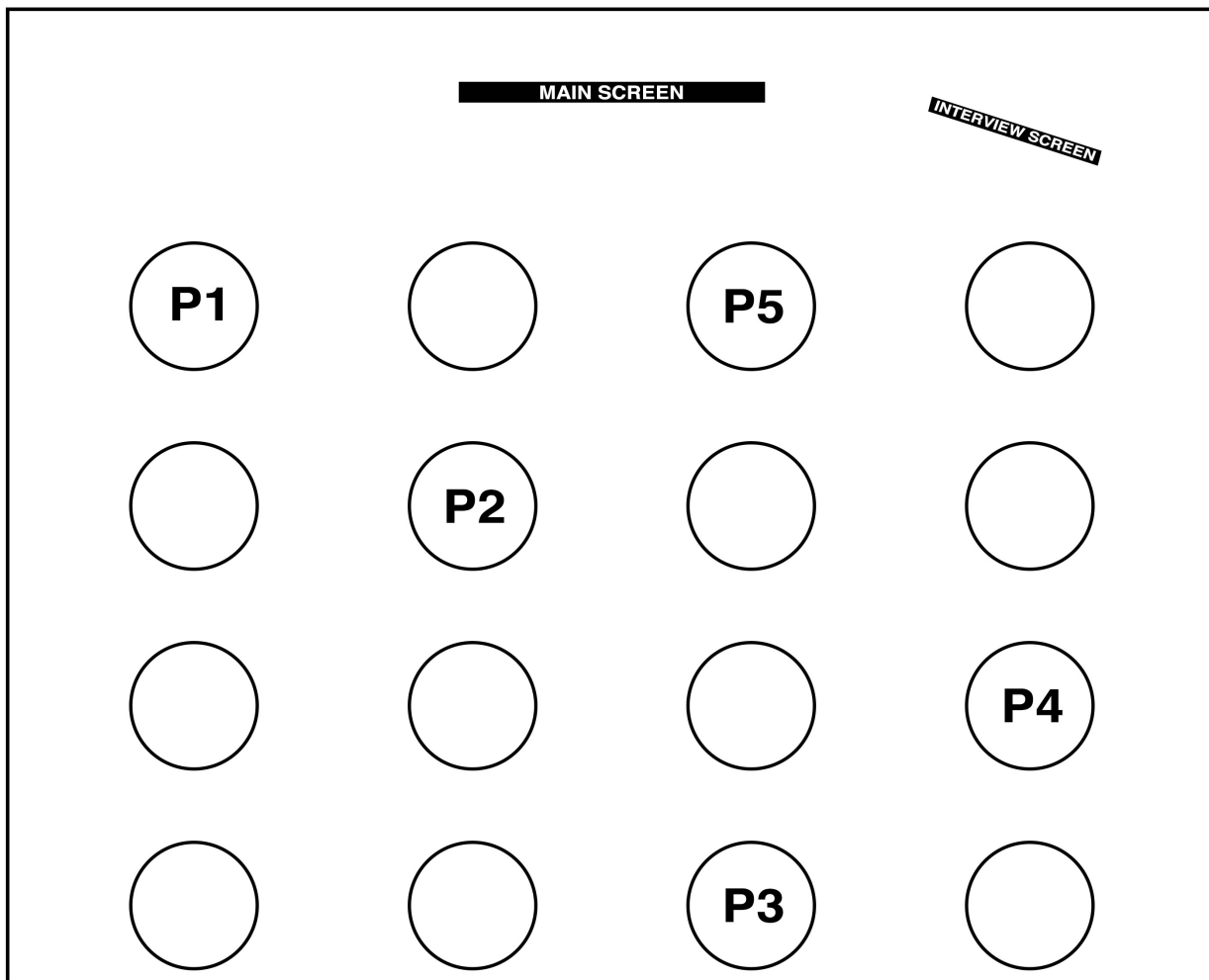
repeat until cue

20

V. Done! [grunt] Done! [yawn] Done! [whistle] Aye Aye Sir!

B.

PERFORMER 9



Watch Performer 5 and set her/his tempo in your mind (based on sweeping).

♪ = approx. 68

Together with Performer 9
(♩ = approx. 68)

Performer 5 **5x**

Voice: Done! Done! Done! Done!

Body: Finish coiling the cable

Throw cable on the floor

move to P1, then turn clockwise in place (finish East)

2x

2x

V. Done! Done! [grunt] Done!

B. morph to Basketball

Basketball (East)

1
(+ grunt)

move to P2, then turn clockwise in place (finish South)

2a
(+ aye)

V. Done! [grunt] Done! Done! Aye Aye Sir!

B. Military (South)

2b

V. Done! [grunt] Done! Done! Aye Aye Sir!

B. move to P3, then turn clockwise in place (finish West)

3
(+ whistle)

V. Done! [grunt] Done! Done! [whistle] Aye Aye Sir!

B. morph to Trombone

Trombone (West)

4
(+ yawn)

diminuendo poco a poco

V. Done! [grunt] Done! [yawn] Done! [whistle] Aye Aye Sir!

B. move to P4, then turn clockwise in place (finish North)

Ballet (North)

turn clockwise in place

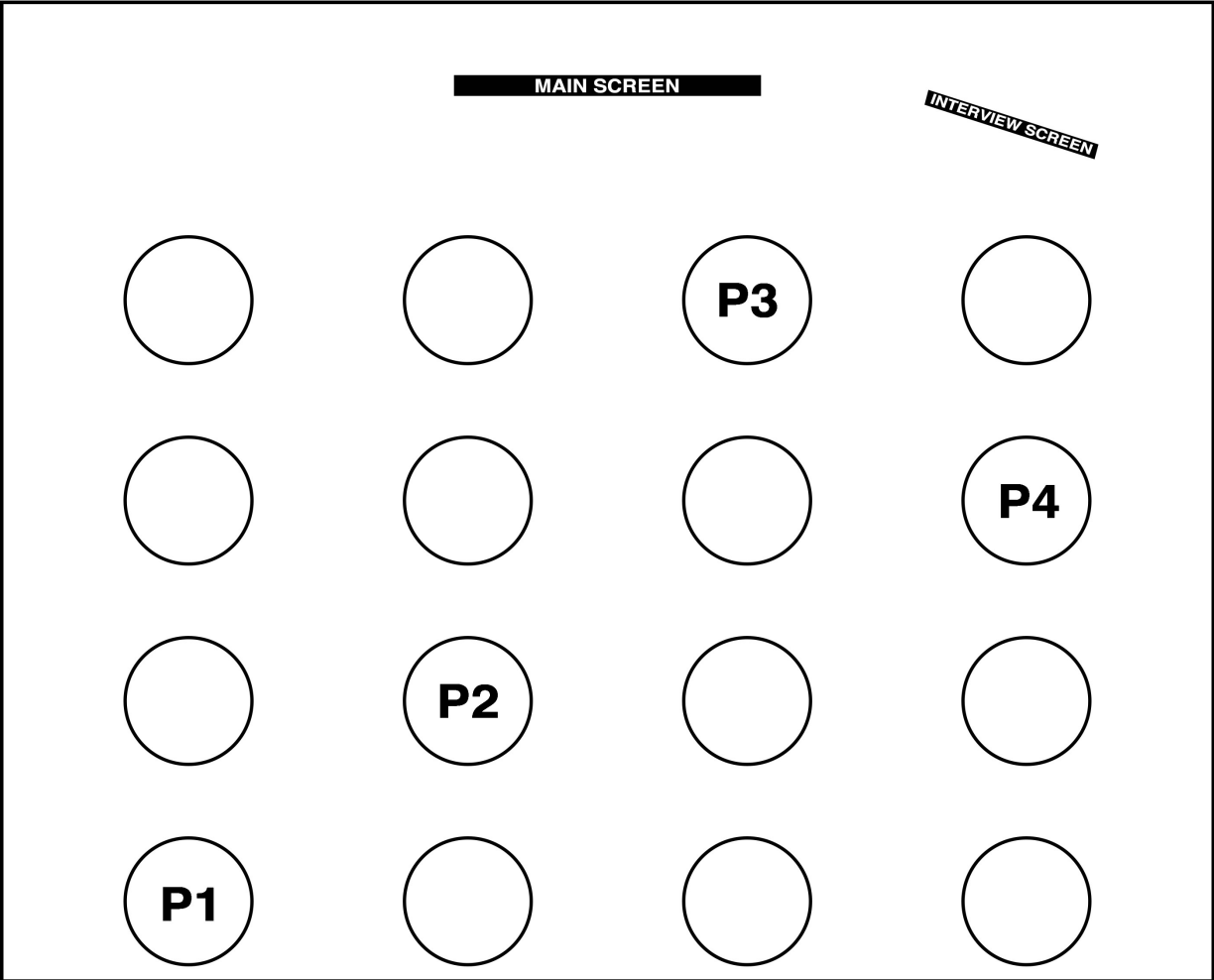
repeat until cue

20

V. Done! [grunt] Done! [yawn] Done! [whistle] Aye Aye Sir!

B.

PERFORMER 10



MOVEMENT II

- 9 of you will be arranged in a 3x3 grid, while the 10th performer is independent.
- You will be using your smartphones to stream video to the projection screen (via Syphon/Max on my computer).
- If you don't have an iPhone or an Android, or if you are not comfortable using your own device, please let me know in advance (I will have a few spares). Please install TLRemoteCamera from the Apple App Store or Google Play Store.
- The score shows the movement in the grid, as well as the approximate views on your screens.
- When you rehearse with your smartphones, notice that the image is wide (probably 16:9), but it will be trimmed to a square when projected, so try to catch the indicated face-parts in the middle of the screen.
- Sorry that all the 3D models are males.

Score instructions:

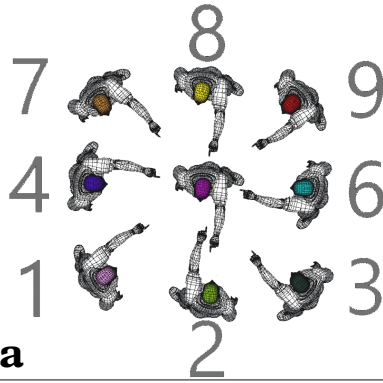
- This score has to be performed from memory.
- Each of you will hold your smartphone in the left hand with the screen towards you, so you can see what you are streaming.
- The movement is notated above the staff and the text is below.
- You won't have microphones for this, so keep the voice level pretty high, but don't shout.
- Actions represent *What* you are moving (Body / Head / Cam), *where* in respect to the previous position—**left, right, turn around**—and *where* you are aiming the camera at (mouth, nose, face, etc.).
- Numbers in brackets (e.g., [5]) represent the performer you are turning to or aiming the camera at.
- When a new movement in the grid follows the end of a sentence, or when two or more speak in unison, one of you should cue the other(s) by breathing in through the mouth just before starting to speak.

Text: The computer voice is given as reference. You don't need to follow the pacing of the recording accurately, but rather use it to inform your reading style.

Performer 10

- Watch this video (<https://www.youtube.com/watch?v=e27TUmMkOAO>) and appropriate the moving style of the QWOP figure. Imagine how the figure would learn to stand up from the floor (from laying on your back) and use that movement in the beginning of the Movement. Imitate a little bit of the QWOP AI movement as you stand up (say, 3:33-3:53 in the video), but feel free to improvise the rest based on this style (until transitioning to DeepMind AI style).
- GIFs for the rest of the movements are provided.

Grid Arrangement



P1a

P1b

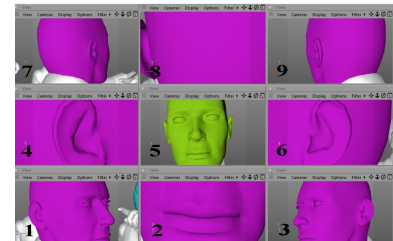
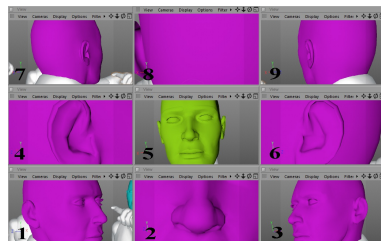
0:00 **Timings are relative to the computer voice in the audio file, but need not be accurately followed in performance.** 0:09

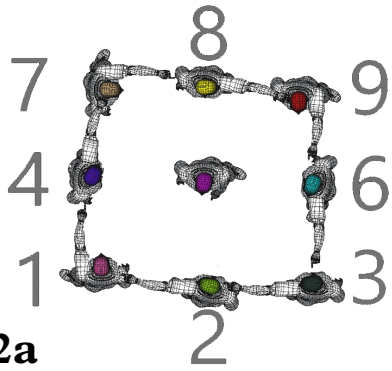
0:10

Performer 1
Performer 2
Performer 3
Performer 4
Performer 5
Performer 6
Performer 7
Performer 8
Performer 9
Performer 10

Body/Head/Cam [5] on head		
Body/Head/Cam [5] on head	Lower Cam [5] on <u>mouth</u>	
<i>By agreeing, you consent to the placing of cookies on your computer or device in accordance with Vox Media's Privacy Policy.</i>		
Body/Head/Cam [5] on head		
Body/Head/Cam [5] on head		
Body/Head/Cam left [2] on nose		
		<i>I agree.</i>
Body/Head/Cam [5] on head		
Body/Head/Cam [5] on head		
Body/Head/Cam [5] on head		
Body/Head/Cam [5] on head		
Body/Head/Cam [5] on head		
Lay flat on your back on the floor		

Smartphone Camera View





P2a

P2b

P2c

P2d

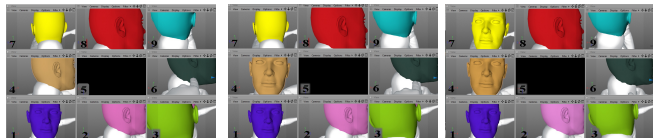
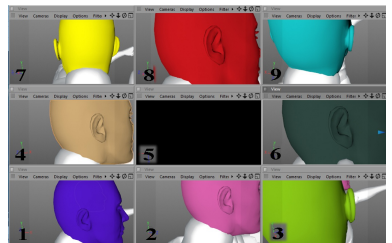
0:11

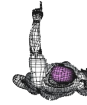
0:12

0:13

0:14

P. 1	Body/Head/Cam left [4] on <u>face</u>			
P. 2	Head/Cam left [1] on <u>face</u>			
P. 3	Body right [6] / Head/Cam left [2] on <u>face</u>			
P. 4	Head/Cam left [7] on <u>face</u>	Head right [1]	<i>Tech.</i>	
P. 5	Cover lens with right-hand and lower Cam BLACK			
P. 6	Head/Cam left [3] on <u>face</u>			
P. 7	Body/Head/Cam left [8] on <u>face</u>		Head right [4]	<i>Science.</i>
P. 8	Head/Cam left [9] on <u>face</u>			Head right [7]
P. 9	Body/Head/Cam left [6] on <u>face</u>			
P. 10				





P2e

0:15

P2f

0:16

P2g

0:17

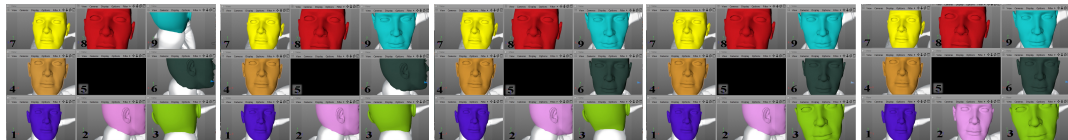
P2h

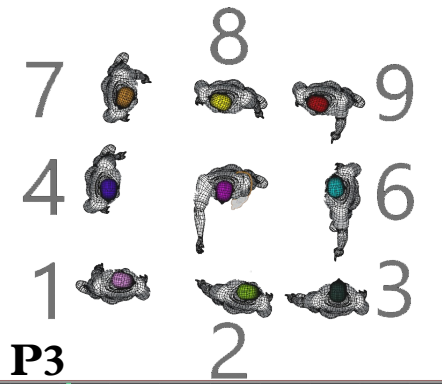
0:18

P2i

0:19

P. 1				Head right [2]
P. 2			Head right [3]	<i>Video.</i>
P. 3		Head right [6]	<i>Long form.</i>	
P. 4				
P. 5	<hr/>			
P. 6	Head right [9]	<i>Reviews.</i>		
P. 7				
P. 8	<i>Culture.</i>			
P. 9	Head right [8]	<i>Cars.</i>		
P. 10				



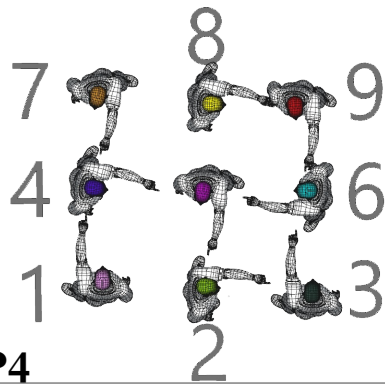


0:21

0:24

P. 1	0:20 More.	Lower Cam and cover lens with right-hand BLACK	
P. 2		Lower Cam and cover lens with right-hand BLACK	
P. 3		Lower Cam and cover lens with right-hand BLACK	
P. 4		Lower Cam and cover lens with right-hand BLACK	
P. 5		Move Cam to RH, raise RH (Cam to self)	Tech. Artificial Intelligence.
P. 6		Lower Cam and cover lens with right-hand BLACK	
P. 7		Lower Cam and cover lens with right-hand BLACK	
P. 8		Lower Cam and cover lens with right-hand BLACK	
P. 9		Lower Cam and cover lens with right-hand BLACK	
P. 10			Imitate QWOP AI learning how to stand up



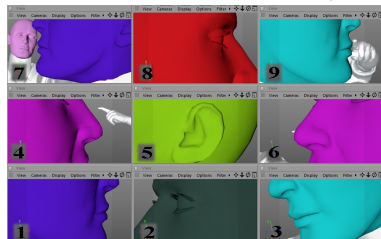


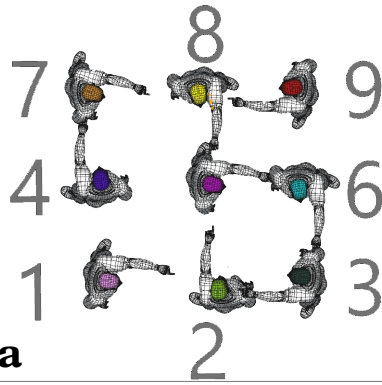
P4

0:26

0:27

P. 1	Head left [4], raise Cam and zoom on <u>mouth</u>	
P. 2	Body right [3], raise Cam and zoom on <u>eye</u>	
P. 3	Raise Cam [6] and zoom on <u>mouth</u>	
P. 4	Head left [5], raise Cam and zoom on <u>nose</u>	
P. 5	Move Cam to left-hand and turn around [2], zoom on <u>ear</u>	<i>DeepMind's AI is teaching itself parkour, and the results are adorable [23]. Like watching a baby learn to limbo. By James Vincent @jjvincent July 10, 2017, 8:21am EDT</i>
P. 6	Head left [5], raise Cam and zoom on <u>nose</u>	
P. 7	Body right [4], raise Cam and zoom on <u>mouth</u>	<i>DeepMind's AI is teaching itself parkour, and the results are adorable [23]. Like watching a baby learn to limbo. By James Vincent @jjvincent July 10, 2017, 8:21am EDT</i>
P. 8	Body/Head left [9], raise Cam and zoom on <u>eye</u>	
P. 9	Head left [6], raise Cam and zoom on <u>mouth</u>	
P. 10		





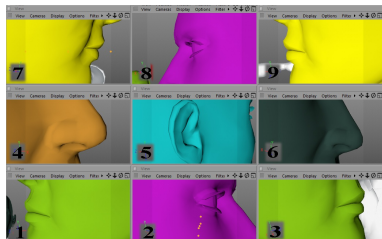
P5a

0:43

0:44

0:45

P. 1	Body/Head/Cam right [2] on <u>mouth</u>		
P. 2	Body/Head/Cam left [5] on <u>eye</u>	Breathe in	<i>Keeping up with the latest AI research can be an odd experience.</i>
P. 3	Body/Head/Cam left [2] on <u>mouth</u>		
P. 4	Body/Head/Cam left [7] on <u>nose</u>		
P. 5	Share Body/Head/Cam left [6] on <u>ear</u>		
P. 6	Body/Head/Cam left [3] on <u>nose</u>		
P. 7	Share Body/Head/Cam left [8] on <u>mouth</u>		
P. 8	Body/Head/Cam right [5] on <u>eye</u>	Breathe in	<i>Keeping up with the latest AI research can be an odd experience.</i>
P. 9	Body/Head/Cam right [8] on <u>mouth</u>		
P. 10			

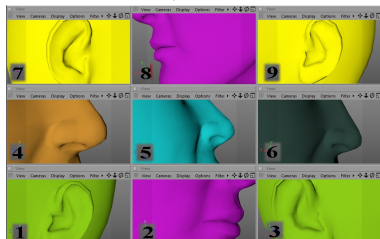


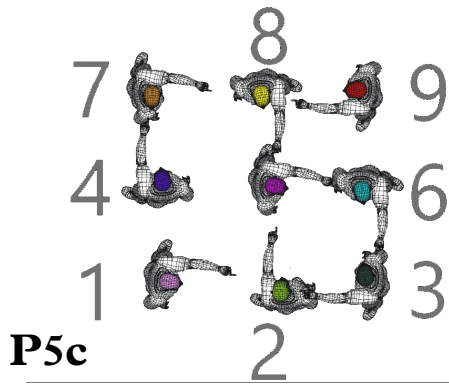
P5b

0:49

0:50

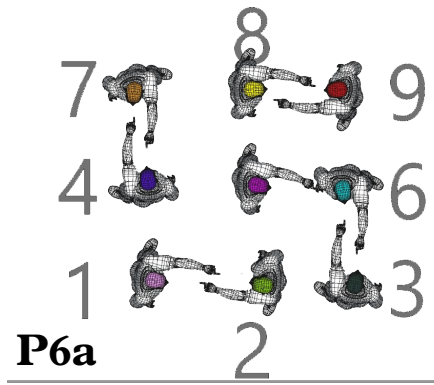
P. 1	[2] on <u>ear</u>	
P. 2	[5] on <u>mouth</u>	
P. 3	[2] on <u>ear</u>	
P. 4		
P. 5	[6] on <u>nose</u>	
P. 6	<i>On the one hand, -></i>	<i>-> you're aware that you're looking at cutting-edge experimentation, with new papers outlining the ideas and methods that will probably (eventually) snowball into the biggest technological revolution of all time.</i>
P. 7	[8] on ear	
P. 8	[5] on <u>mouth</u>	
P. 9	[8] on ear	
P. 10		





P5c

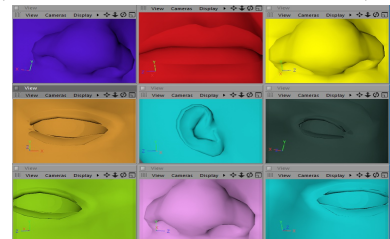
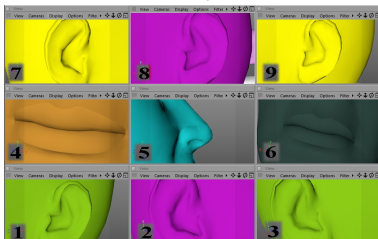
1:03



P6a

1:09

P. 1			[2] on <u>left-eye</u>
P. 2	[5] on <u>ear</u>		Body/Head/Cam left [1] on <u>nose</u>
P. 3	Head right [6]		Body/Cam right [6] on <u>right-eye</u>
P. 4	<i>On the other hand, -></i>	<i>-> sometimes what you're looking at is just unavoidably weird and funny.</i>	
P. 5	[7] on <u>mouth</u>		[7] on <u>left-eye</u>
P. 6			[6] on <u>ear</u>
P. 7	[3] on <u>mouth</u>		[3] on <u>right-eye</u>
P. 8	Head right [4]		Body/Cam right [4] on <u>nose</u>
P. 9	<i>On the other hand, -></i>	<i>-> sometimes what you're looking at is just unavoidably weird and funny.</i>	
P. 10	[5] on <u>ear</u>		Body/Head/Cam left [9] on <u>mouth</u>
			[8] on <u>nose</u>

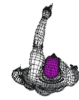




P6b



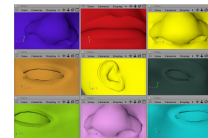
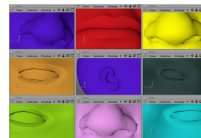
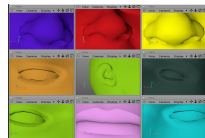
P6c

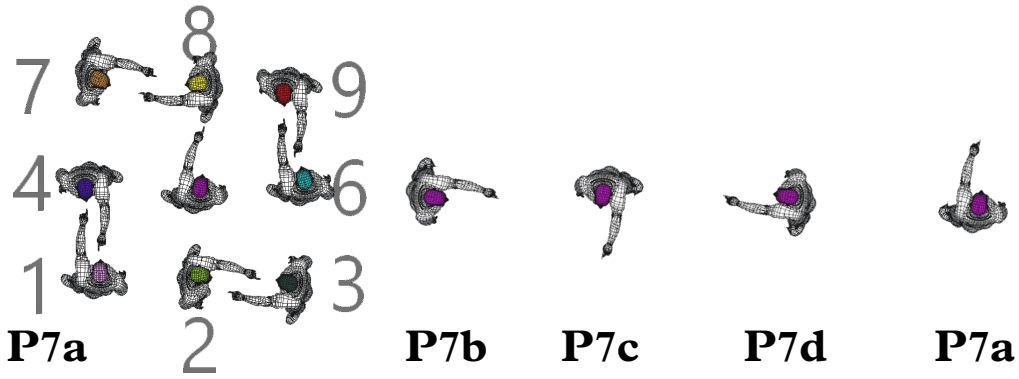


P6d

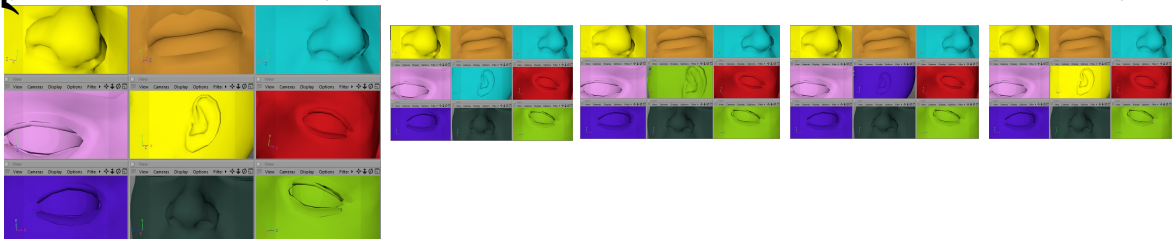
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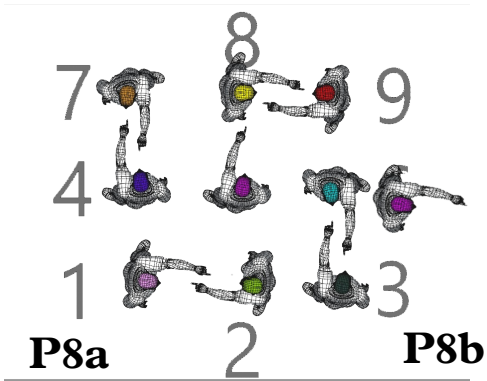
P. 1	
P. 2	
P. 3	
P. 4	
P. 5	Body/Head/Cam clockwise [2] -> [4] -> [8] on ear (on <i>Google's</i> -> <i>Emergence</i> -> <i>environments</i>)
P. 6	
P. 7	
P. 8	
P. 9	<i>Case in point is a new paper from Google's AI subsidiary DeepMind titled "Emergence of Locomotion Behaviours in Rich Environments."</i>
P. 10	Transition to DeepMind AI walking (GIF1)





P. 1	Body/Head/Cam left [4] on <u>left-eye</u>	
P. 2	Body/Head/Cam around [3] on <u>nose</u>	
P. 3	Body/Head/Cam right [2] on <u>right-eye</u>	
P. 4	Body/Head/Cam around [1] on <u>left-eye</u>	
P. 5		Body/Head/Cam clockwise [6] -> [2] -> [4] -> [8] on <u>ear</u> (on <i>explores</i> -> <i>or RL</i> -> <i>navigate</i> -> <i>environments</i>)
P. 6	Body/Head/Cam around [9] on <u>right-eye</u>	
P. 7	Body/Head/Cam left [8] on <u>nose</u>	
P. 8	Body/Head/Cam around [7] on <u>mouth</u>	<i>The research explores how reinforcement learning (or RL) can be used to teach a computer to navigate unfamiliar and complex environments.</i>
P. 9	Body/Head/Cam left [6] on <u>nose</u>	
P. 10	----->	Walking in place (GIF1)

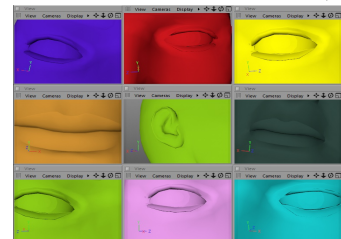
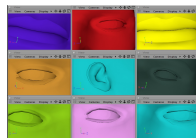
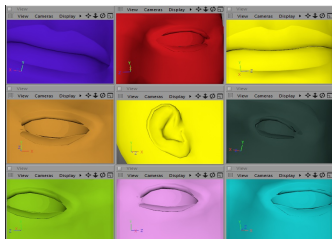


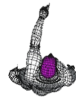
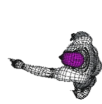


1:28

1:29

P. 1	Body/Head/Cam right [2] on <u>left-eye</u>	
P. 2	Body/Head/Cam around [1] on <u>left-eye</u>	
P. 3	Body/Head/Cam right [6] on <u>right-eye</u>	
P. 4	Body/Head/Cam around [7] on <u>left-eye</u>	[7] on <u>mouth</u> (on <i>worlds</i>)
P. 5		<i>It's the sort of fundamental AI research that we're now testing in virtual worlds,</i> Body/Head/Cam clockwise [6] -> [2] -> [4] -> [8] on <u>ear</u> (on <i>fundamental</i> -> <i>worlds</i> -> <i>robots</i> -> <i>house</i>)
P. 6	Body/Head/Cam around [3] on <u>right-eye</u>	[3] on <u>mouth</u> (on <i>worlds</i>)
P. 7	Body/Head/Cam right [4] on <u>mouth</u>	[4] on <u>left-eye</u> (on <i>worlds</i>)
P. 8	Body/Head/Cam around [9] on <u>right-eye</u>	
P. 9	Body/Head/Cam right [8] on <u>mouth</u>	[8] on <u>left-eye</u> (on <i>worlds</i>)
P. 10		

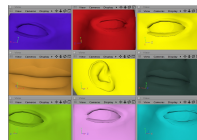
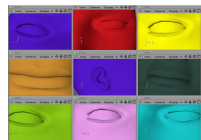


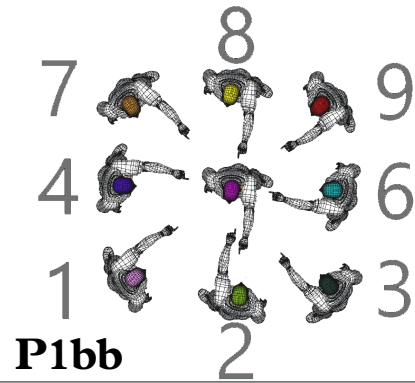


P8d

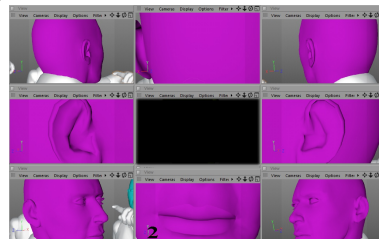
P8e

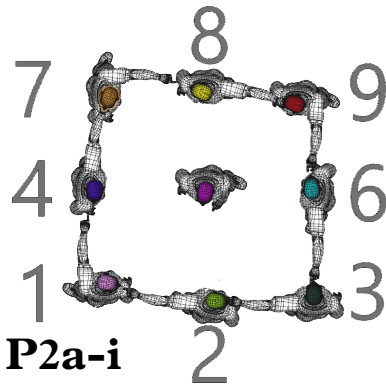
	1:34	1:43	
P. 1	Close eyes on <i>robots</i>	Open eyes on <i>look</i>	
P. 2	Close eyes on <i>robots</i>	Open eyes on <i>look</i>	
P. 3	<i>but that will one day help program robots that can navigate the stairs in your house.</i>	<i>Don't believe me? Just look at DeepMind's agent -></i>	
P. 4	Close eyes on <i>robots</i>	Open eyes on <i>look</i>	
P. 5		3-second general pause	
P. 6	Close eyes on <i>robots</i>		Open eyes on <i>look</i>
P. 7	<i>but that will one day help program robots that can navigate the stairs in your house.</i>		<i>Don't believe me? Just look at DeepMind's agent -></i>
P. 8	Close eyes on <i>robots</i>	Open eyes on <i>look</i>	
P. 9	Close eyes on <i>robots</i>	Open eyes on <i>look</i>	
P. 10	Start combining the walking from GIF1 with hands movement from GIF2		





	1:47	1:59	2:00
P. 1	Cam to [Performer 10] for 13 seconds		Return to first position
P. 2	Cam to [Performer 10] for 13 seconds		Return to first position (on <u>mouth</u>)
P. 3	Cam to [Performer 10] for 13 seconds -> go:		Return to first position
P. 4	Cam to [Performer 10] for 13 seconds		Return to first position
P. 5	Cam to [Performer 10] for 13 seconds	Breathe in	Cover lens with right-hand and lower hand BLACK <i>Everything the stick figure is doing in this video is -></i>
P. 6	Cam to [Performer 10] for 13 seconds		Return to first position
P. 7	Cam to [Performer 10] for 13 seconds -> go:		Return to first position
P. 8	Cam to [Performer 10] for 13 seconds		Return to first position
P. 9	Cam to [Performer 10] for 13 seconds		Return to first position
P. 10	Transition from walking to running (GIF2)		

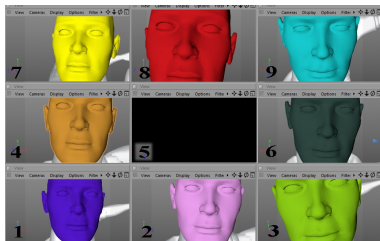




2:05

Body/Head/Cam **left** [4] on face,
then Head **right** [2]

P. 1		<i>The jumping</i>	<i>The limboing</i>	
P. 2	Head/Cam left [1] on <u>face</u> , then Head right [3]			
P. 3	Body right / Head/Cam left [2] on <u>face</u> , then Head right [6]	<i>The jumping</i>		<i>The leaping</i>
P. 4	Head/Cam left [7] on <u>face</u> , then Head right [1]	<i>The jumping</i>	<i>The limboing</i>	
P. 5	-> self-taught.			
P. 6	Head/Cam left [3] on <u>face</u> , then Head right [9]			
P. 7	Body/Head/Cam left [8] on <u>face</u> , then Head right [4]	<i>The jumping</i>		<i>The leaping</i>
P. 8	Head/Cam left [9] on <u>face</u> , then Head right [7]	<i>The jumping</i>	<i>The limboing</i>	
P. 9	Body/Head/Cam left [6] on <u>face</u> , then Head right [8]	<i>The jumping</i>		<i>The leaping</i>
P. 10	----->	<i>The jumping</i>	<i>The limboing</i>	



Running in place (GIF2)

P. 1		<i>The jumping</i>		<i>The jumping</i>
P. 2	<i>The limboing</i>			<i>The jumping</i>
P. 3			<i>The leaping</i>	
P. 4	<i>The limboing</i>			<i>The jumping</i>
P. 5	<hr/>			
P. 6		<i>The jumping</i>		
P. 7			<i>The leaping</i>	
P. 8		<i>The jumping</i>		
P. 9	<i>The limboing</i>			
P. 10	<hr/>			

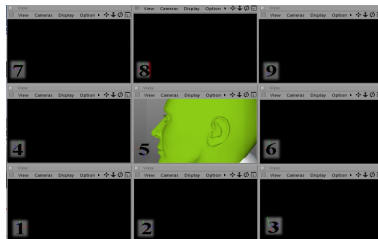
P. 1			<i>The limboing</i>	<i>The leaping</i>
P. 2			<i>The limboing</i>	<i>The leaping</i>
P. 3		<i>The jumping</i>		<i>The leaping</i>
P. 4			<i>The limboing</i>	<i>The leaping</i>
P. 5	Raise Cam [2] on face			
P. 6	<i>The leaping</i>		<i>The limboing</i>	<i>The leaping</i>
P. 7		<i>The jumping</i>		<i>The leaping</i>
P. 8	<i>The leaping</i>		<i>The limboing</i>	<i>The leaping</i>
P. 9	<i>The leaping</i>		<i>The limboing</i>	<i>The leaping</i>
P. 10				

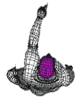


2:17

2:24

P. 1	Lower cam and cover lens with right-hand BLACK		
P. 2	Lower cam and cover lens with right-hand BLACK <i>all of these are behaviors that the computer has devised itself as the best way of getting from -></i>	-> A to B.	
P. 3	Lower cam and cover lens with right-hand BLACK		
P. 4	Lower cam and cover lens with right-hand BLACK		
P. 5		Turn around counter-clockwise [8] on face	Turn around counter-clockwise [2] on face (on <i>virtual sensors</i>)
P. 6	Lower cam and cover lens with right-hand BLACK		
P. 7	Lower cam and cover lens with right-hand BLACK		
P. 8	Lower cam and cover lens with right-hand BLACK		<i>All DeepMind's programmers have done is give the agent a set of virtual sensors</i>
P. 9	Lower cam and cover lens with right-hand BLACK		
P. 10	Transition from running in place (GIF2) to running around (GIF3) with new hands movement		Running (GIF3)

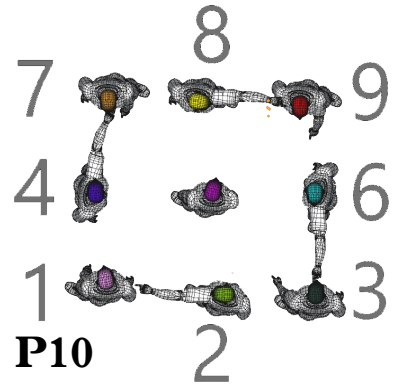




P9b

2:29

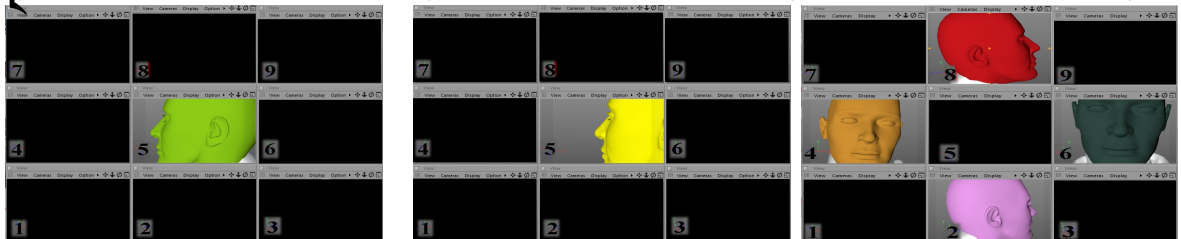
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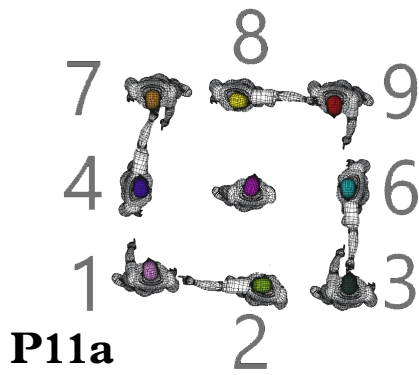


P10

2:43

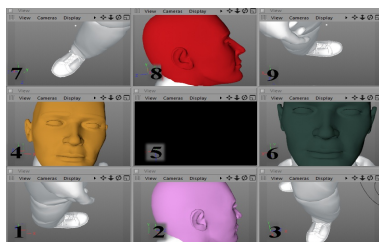
P. 1		Head left [4]
P. 2	<i>(so it can tell whether it's upright or not, for example)</i>	Head/Cam left [1] on face
P. 3		
P. 4		Head/Cam left [7] on face
P. 5	Turn around clockwise [8] on face (on <u>face</u> (on <i>for example</i>))	Lower cam and cover lens with right-hand BLACK
P. 6		Head/Cam left [3] on face
P. 7		Body right [4]
P. 8		Head/Cam left [9] on face
P. 9	<i>and then incentivize to move forward. The computer works the rest out for itself, using trial and error to come up with different ways of -></i>	-> moving. Head left [6]
P. 10		

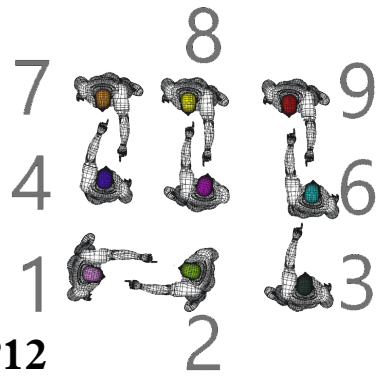




2:44

P. 1	Raise cam slowly [4] on <u>knee</u>	
	<i>The novelty here is that the researchers are exploring how -></i>	<i>-> difficult environments can teach an agent complex and robust movements</i>
P. 2		
P. 3	Raise cam slowly [6] on <u>knee</u>	
	<i>The novelty here is that the researchers are exploring how -></i>	<i>-> difficult environments can teach an agent complex and robust movements</i>
P. 4		
P. 5		
P. 6		
P. 7	Raise cam slowly [4] on <u>knee</u>	
	<i>The novelty here is that the researchers are exploring how -></i>	<i>-> difficult environments can teach an agent complex and robust movements</i>
P. 8		
P. 9	Raise cam slowly [6] on <u>knee</u>	
	<i>The novelty here is that the researchers are exploring how -></i>	<i>-> difficult environments can teach an agent complex and robust movements</i>
P. 10		





P11b

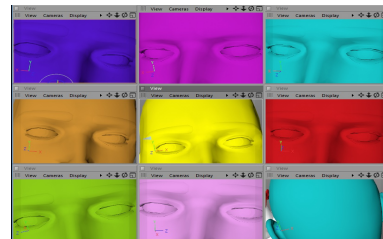
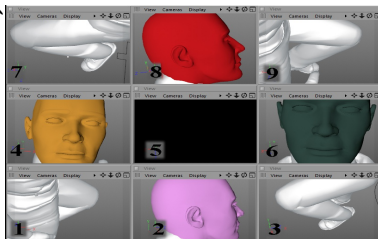
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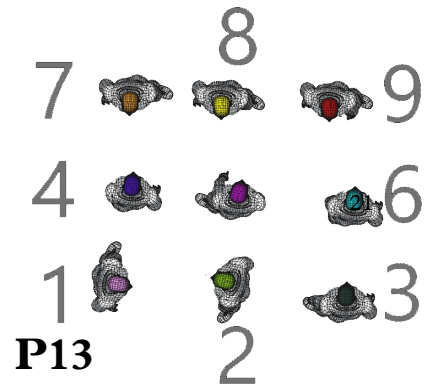
P12

2:56

Body/Head/Cam **right** [2] on eyes

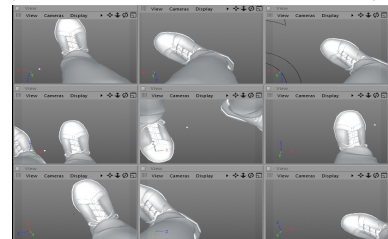
P. 1		
P. 2		Body left [1] on <u>eyes</u>
P. 3		Raise Cam [6] on <u>hair</u>
P. 4	Raise and lower left knee <i>(i.e., using its knee to get purchase on top of a high wall).</i>	Head/Body left [7] on <u>eyes</u>
P. 5		Raise Cam [8] on <u>eyes</u>
P. 6	Raise and lower right knee <i>(i.e., using its knee to get purchase on top of a high wall).</i>	Head/Body/Cam right [9] on <u>eyes</u>
P. 7		Raise Cam [4] on <u>eyes</u>
P. 8		Head/Cam right [5] on <u>eyes</u>
P. 9		Raise Cam [6] on <u>eyes</u>
P. 10	Combine running (GIF3) with jumping (GIF4) and the respective hands movements	





2:57

P. 1		Lower Head/Cam on own <u>feet</u>
P. 2		Lower Head/Cam on own <u>feet</u>
P. 3	<i>Usually, reinforcement learning produces behavior that is fragile, and that breaks down in -></i>	<i>-> unfamiliar circumstances</i>
P. 4		Lower Head/Cam on own <u>feet</u>
P. 5		Lower Head/Cam on own <u>feet</u>
P. 6		Lower Head/Cam on own <u>feet</u>
P. 7		Lower Head/Cam on own <u>feet</u>
P. 8		Lower Head/Cam on own <u>feet</u>
P. 9		Lower Head/Cam on own <u>feet</u>
P. 10		

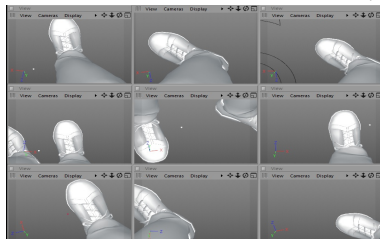




3:05

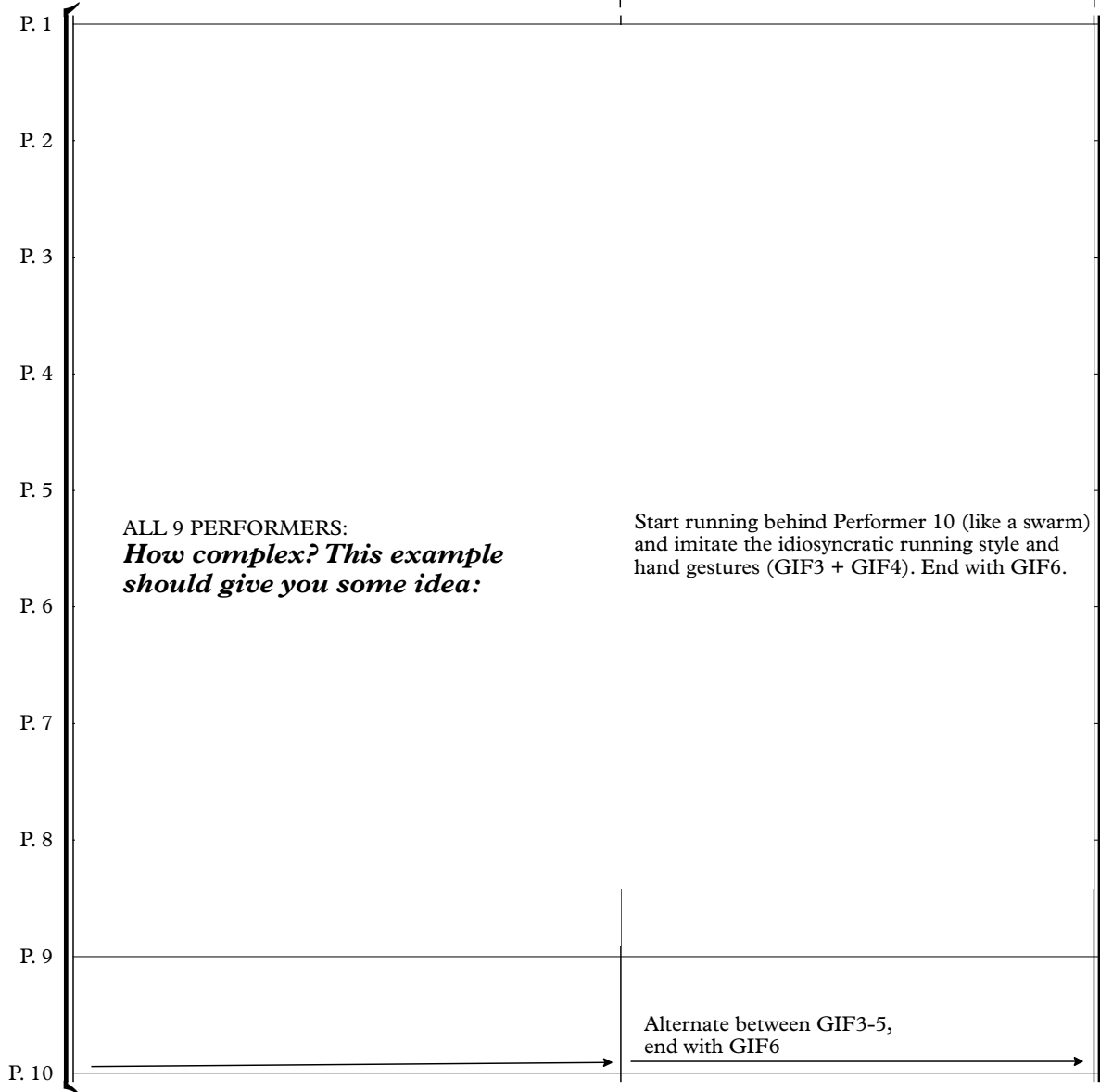
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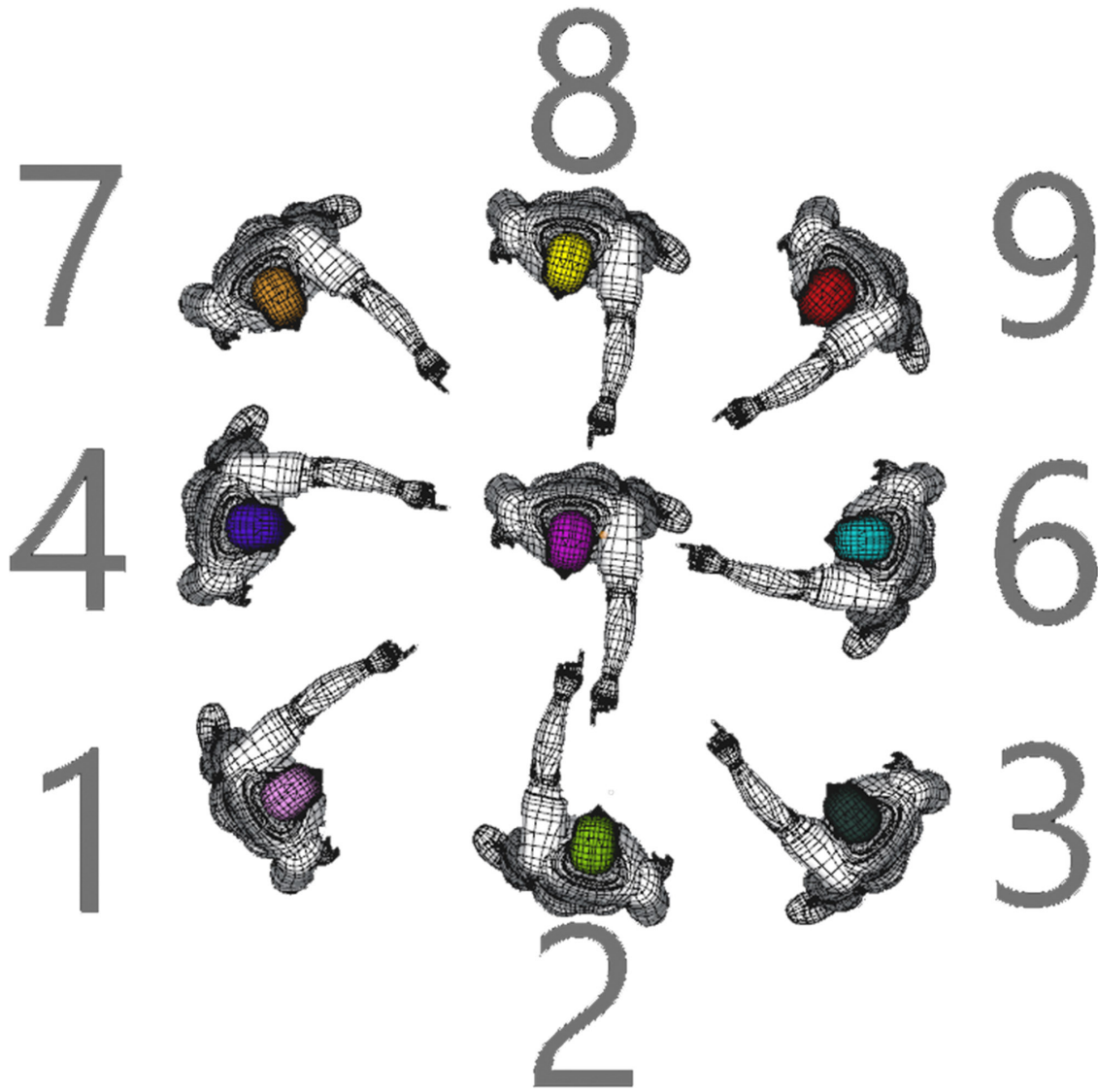
P. 1	Body right (on <i>tackle the stairs</i>)	Cover lens with right-hand (on <i>shows</i>)
P. 1	<i>like a baby who knows how to tackle the stairs at home, but who can't understand an escalator.</i>	
P. 2	Body left (on <i>tackle the stairs</i>)	Cover lens with right-hand (on <i>shows</i>)
P. 3	Body right (on <i>tackle the stairs</i>)	Cover lens with right-hand (on <i>shows</i>)
P. 4	Body left (on <i>tackle the stairs</i>)	Cover lens with right-hand (on <i>shows</i>)
P. 5	Turn around clockwise (on <i>tackle the stairs</i>)	Cover lens with right-hand (on <i>shows</i>)
P. 6	Body right (on <i>tackle the stairs</i>)	Cover lens with right-hand (on <i>shows</i>)
P. 6		<i>This research shows that isn't always the case, and that Reinforcement Learning can be used to teach complex movements.</i>
P. 7	Body right (on <i>tackle the stairs</i>)	Cover lens with right-hand (on <i>shows</i>)
P. 8	Turn around clockwise (on <i>tackle the stairs</i>)	Cover lens with right-hand (on <i>shows</i>)
P. 9	Body left (on <i>tackle the stairs</i>)	Cover lens with right-hand (on <i>shows</i>)
P. 10		GIF5



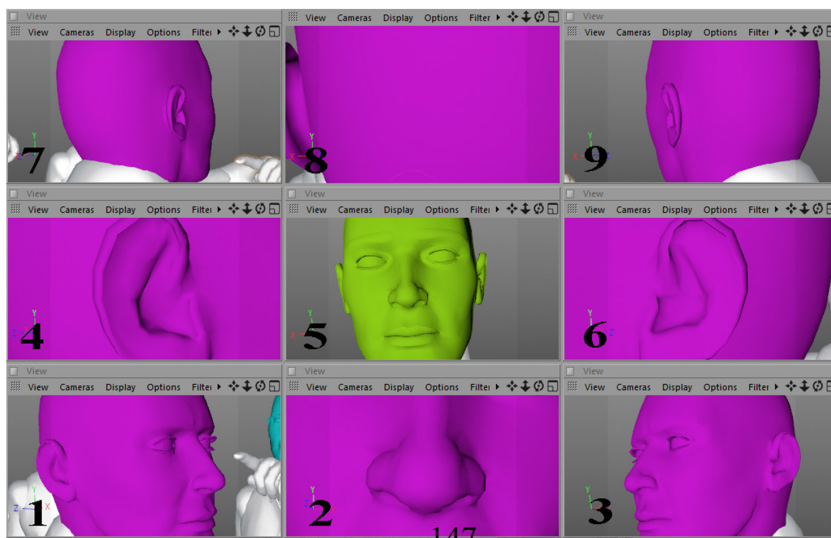
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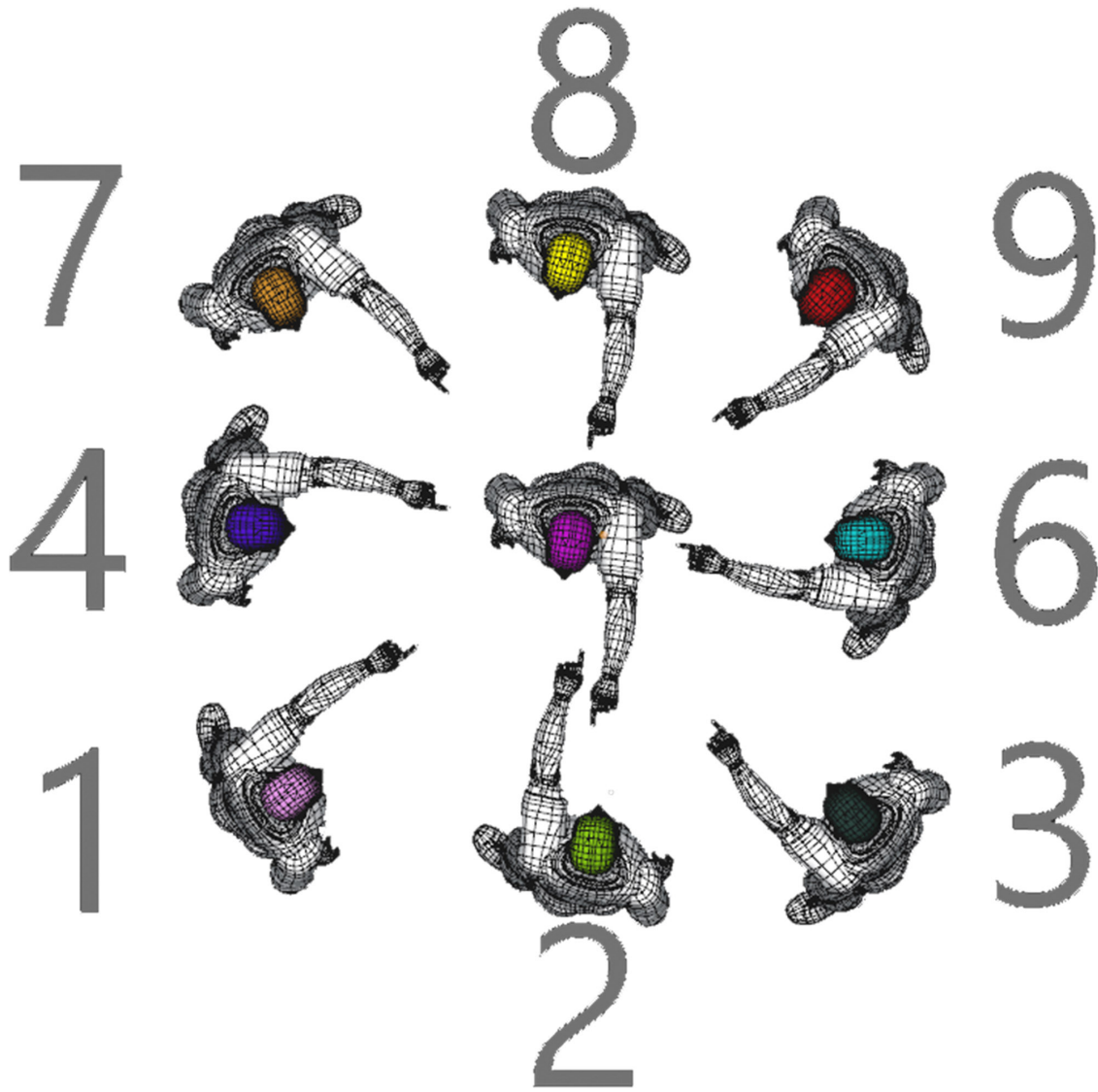
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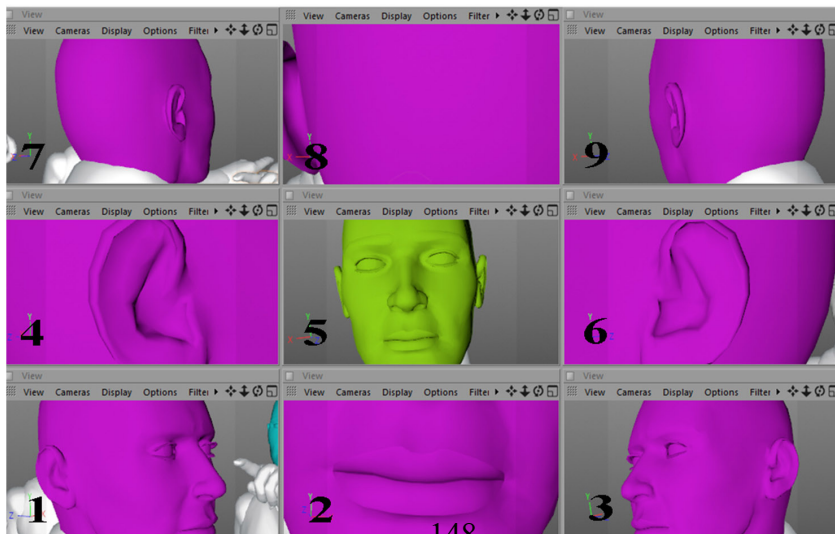


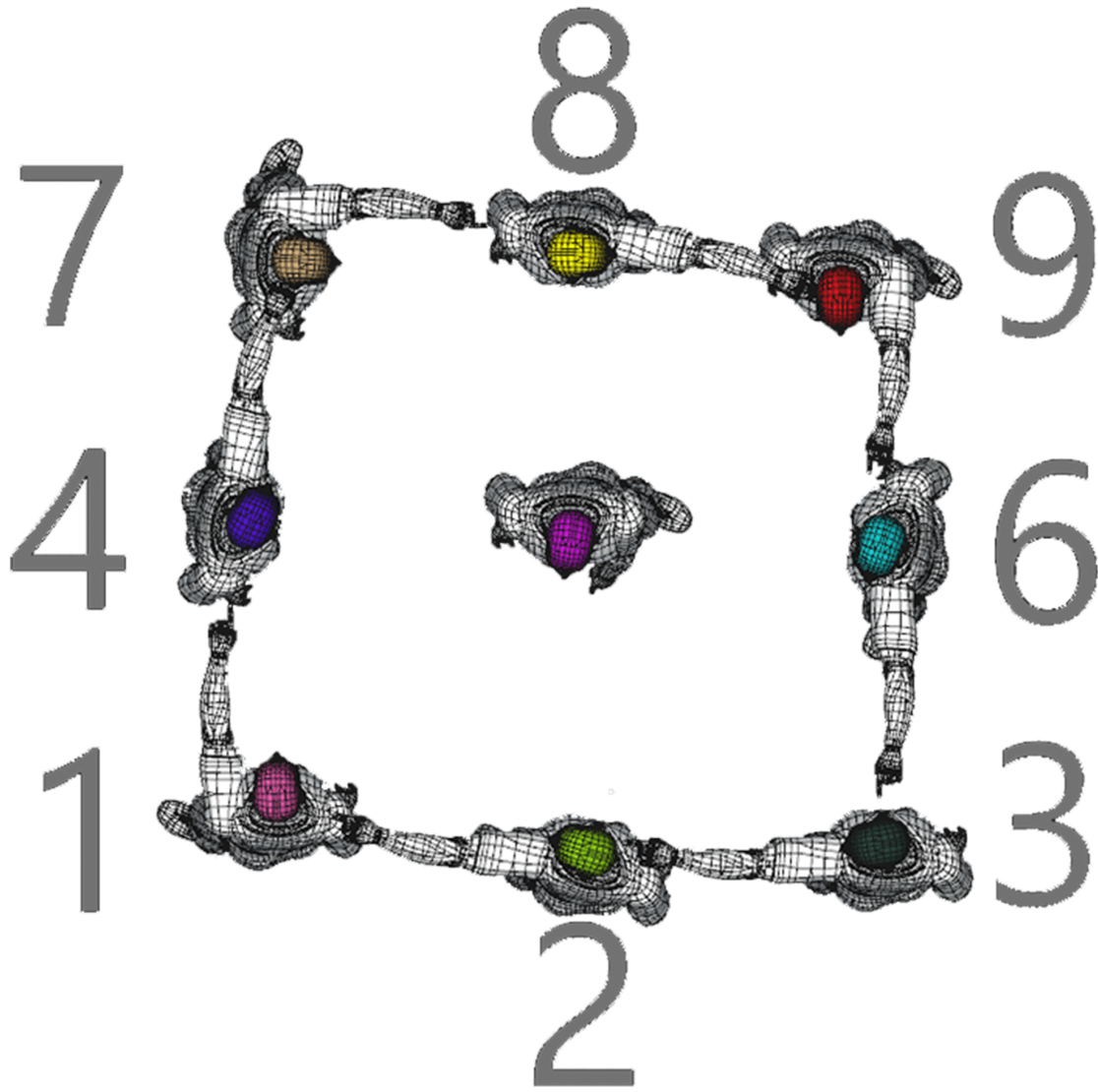
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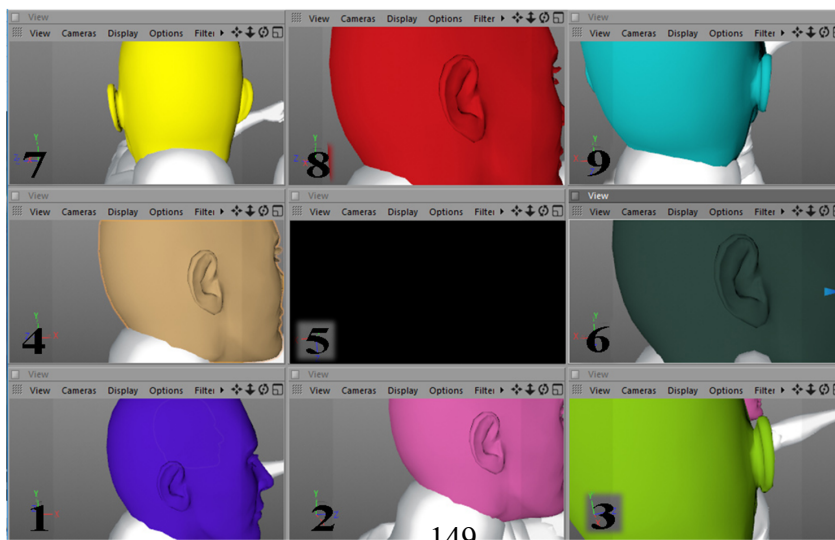


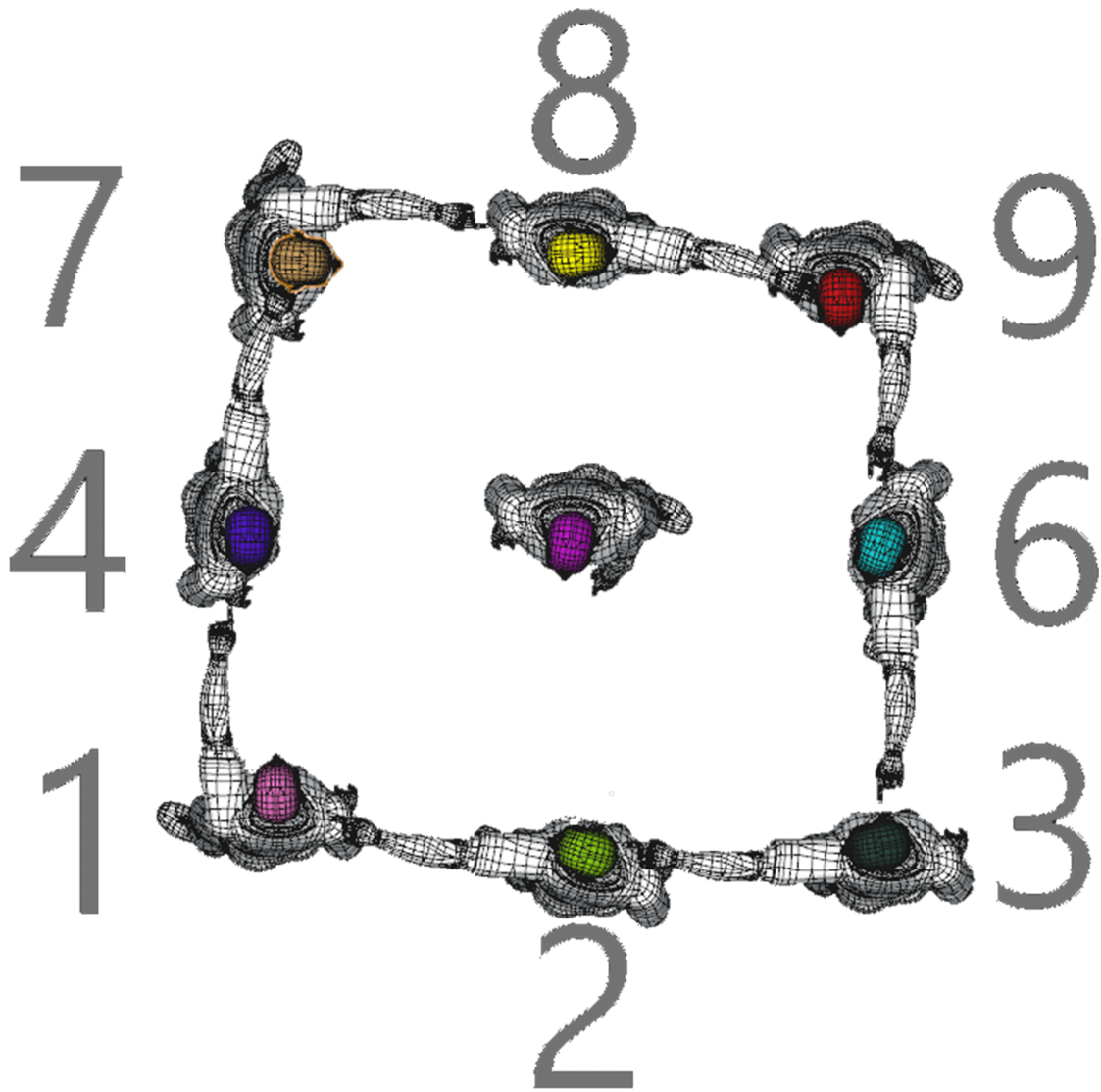
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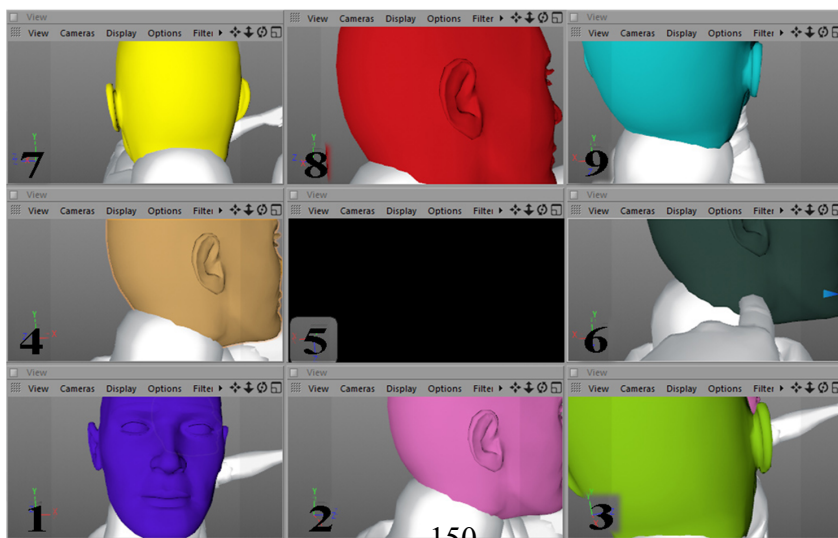


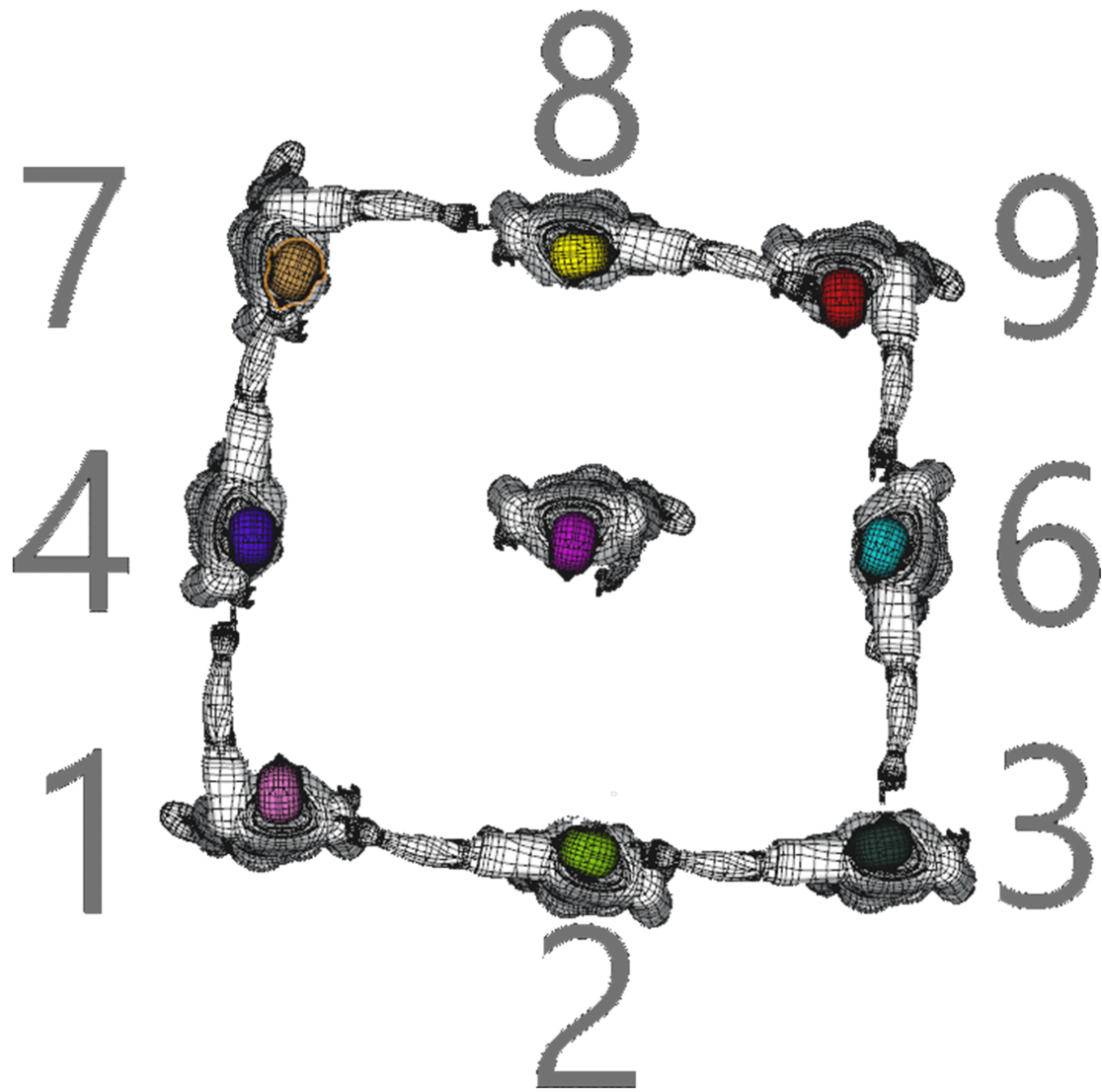
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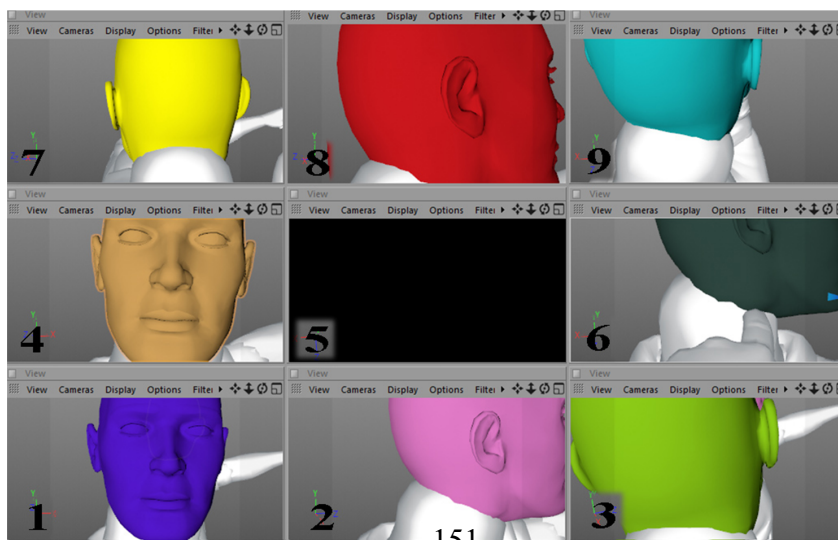


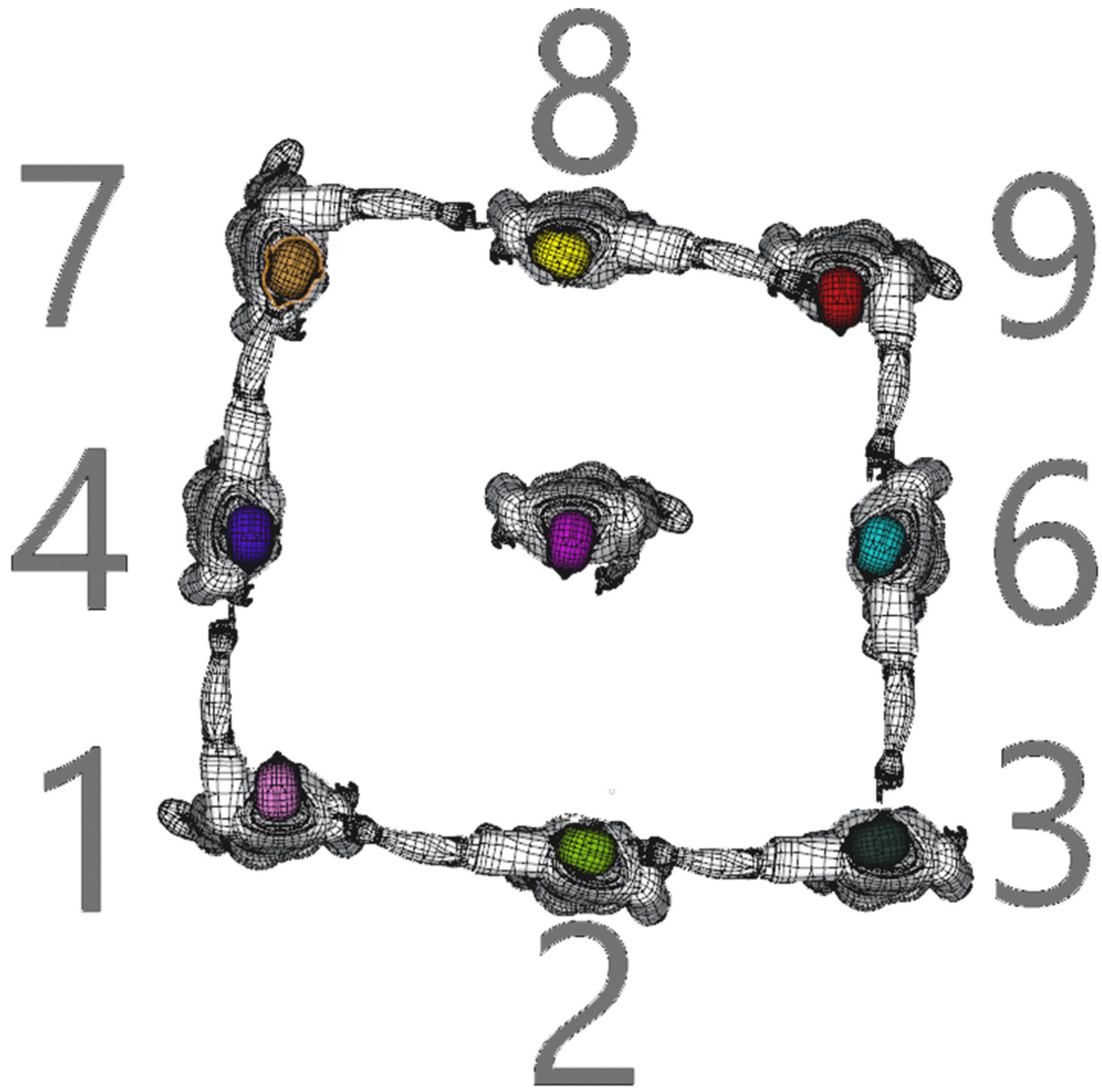
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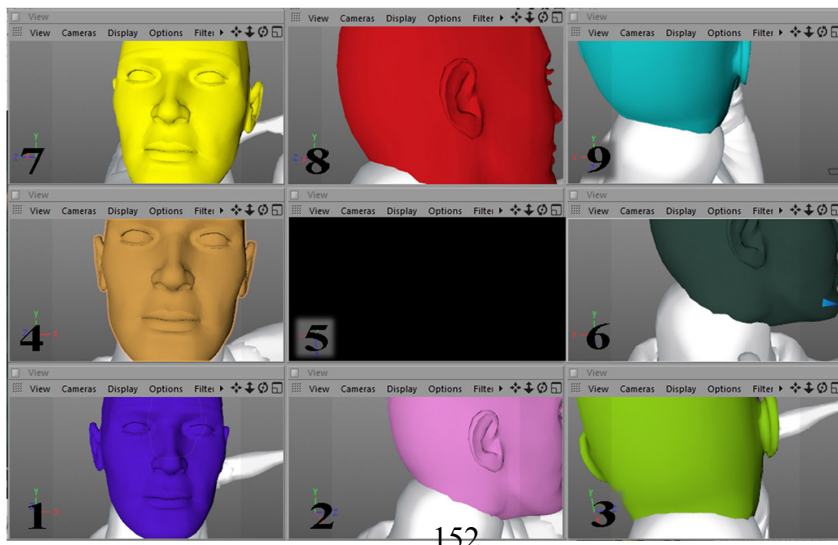


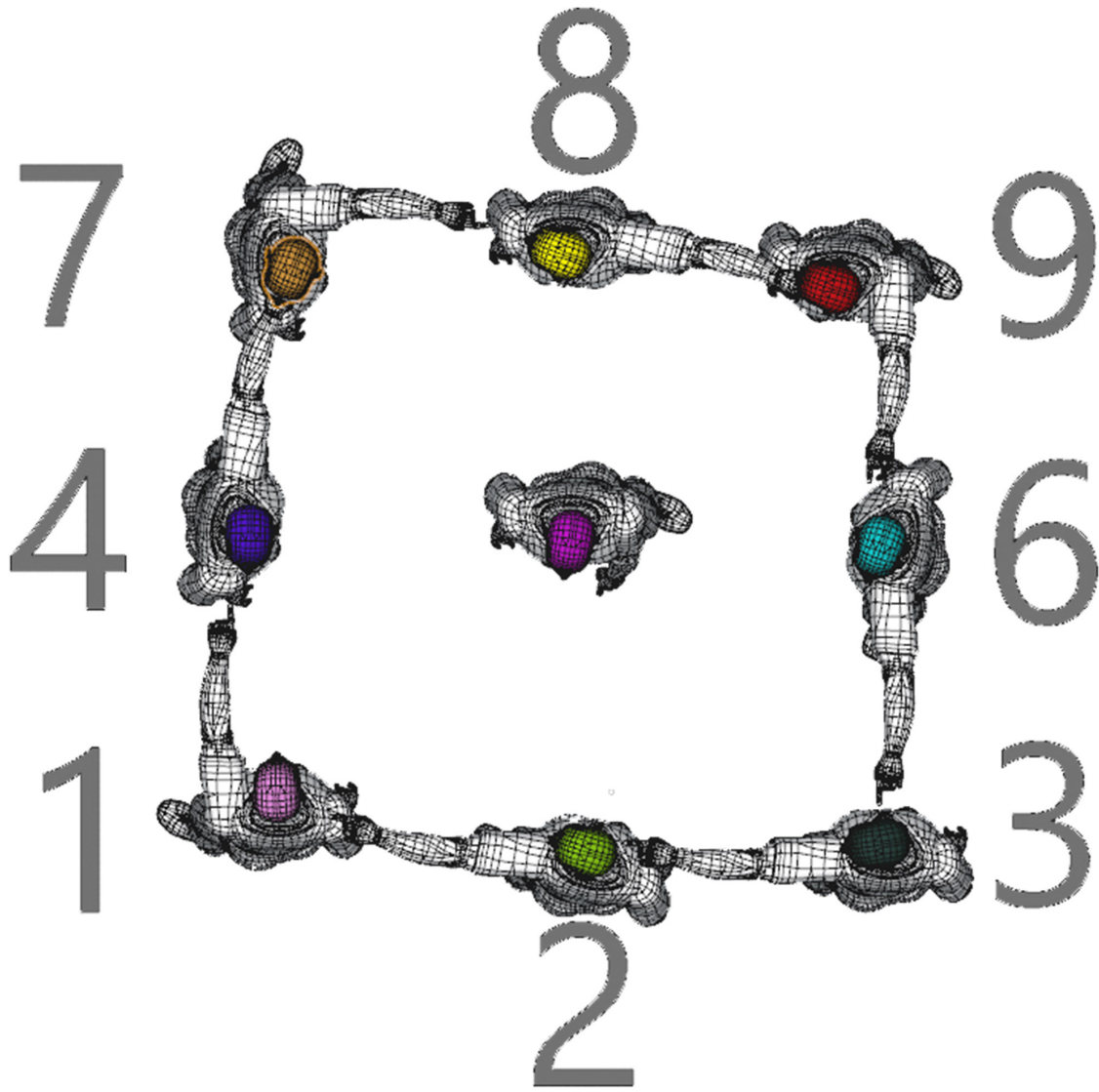
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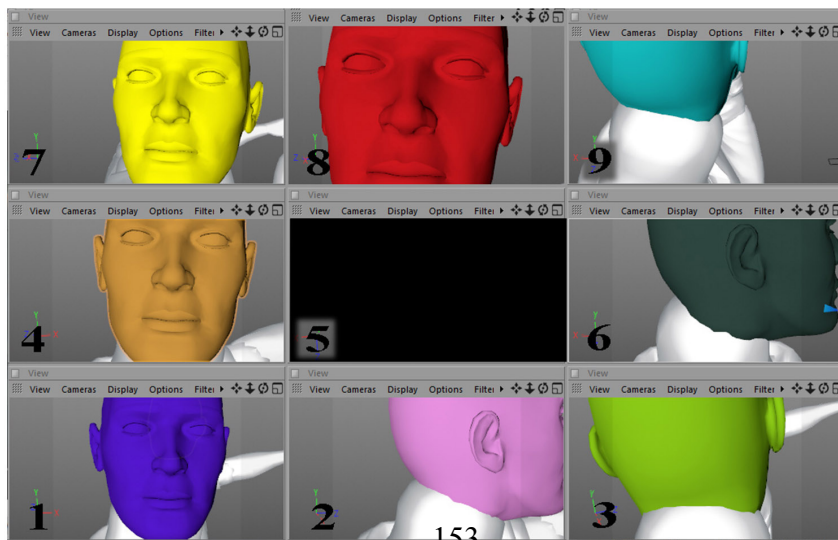


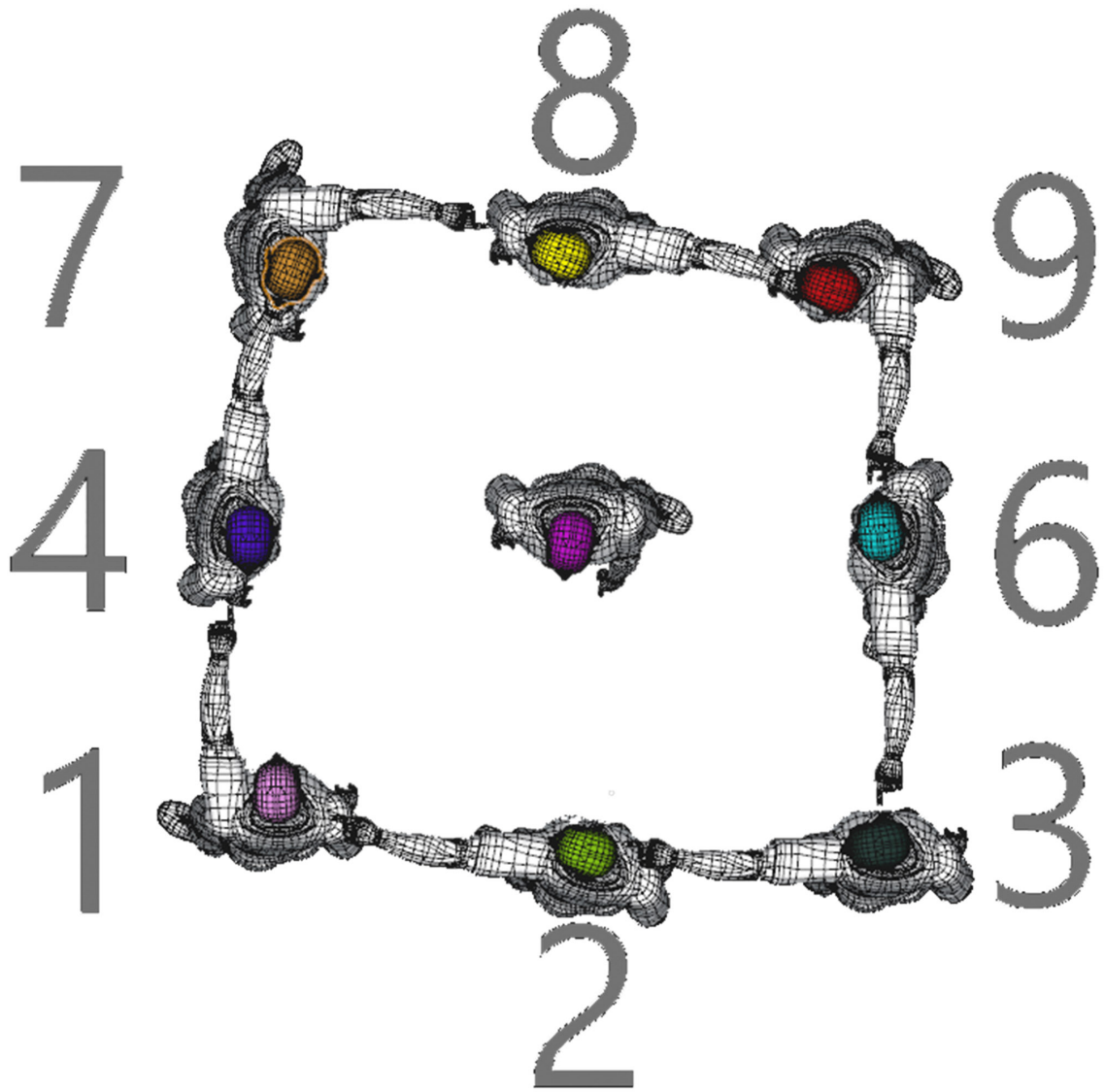
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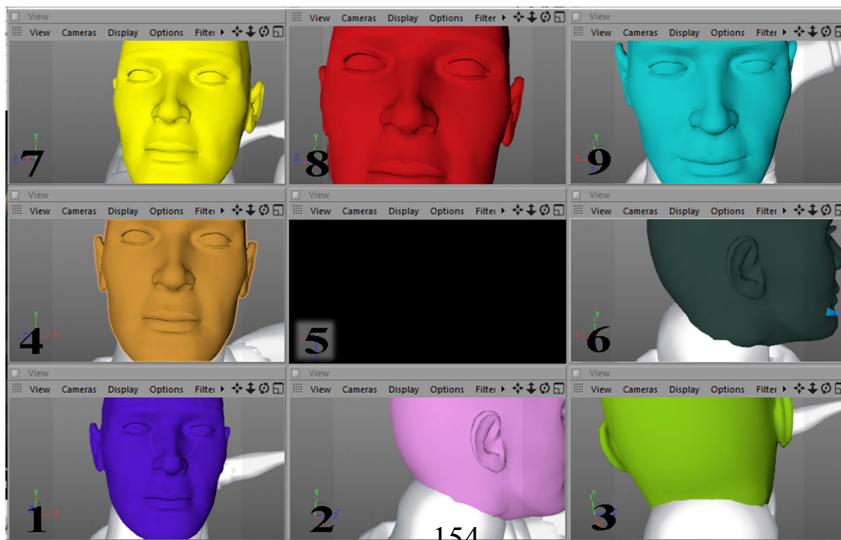


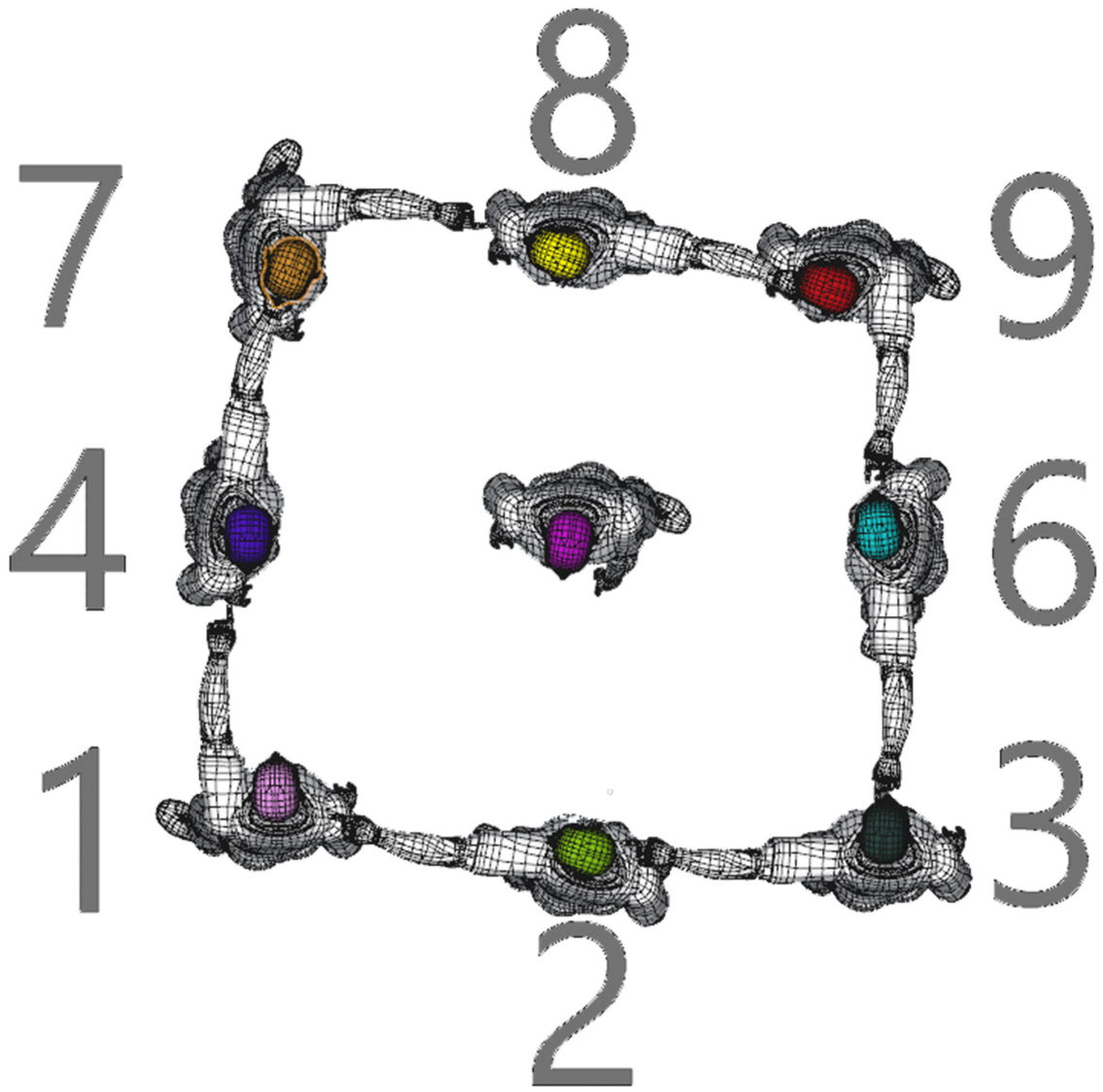
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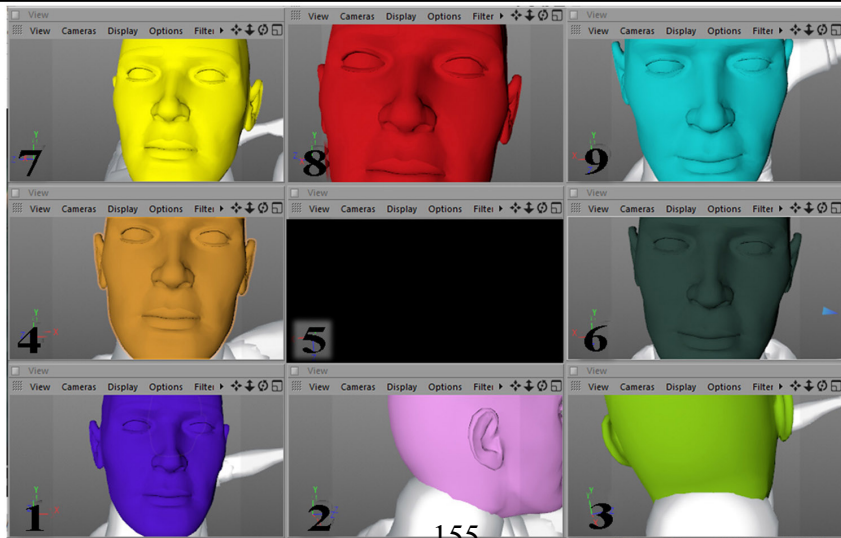


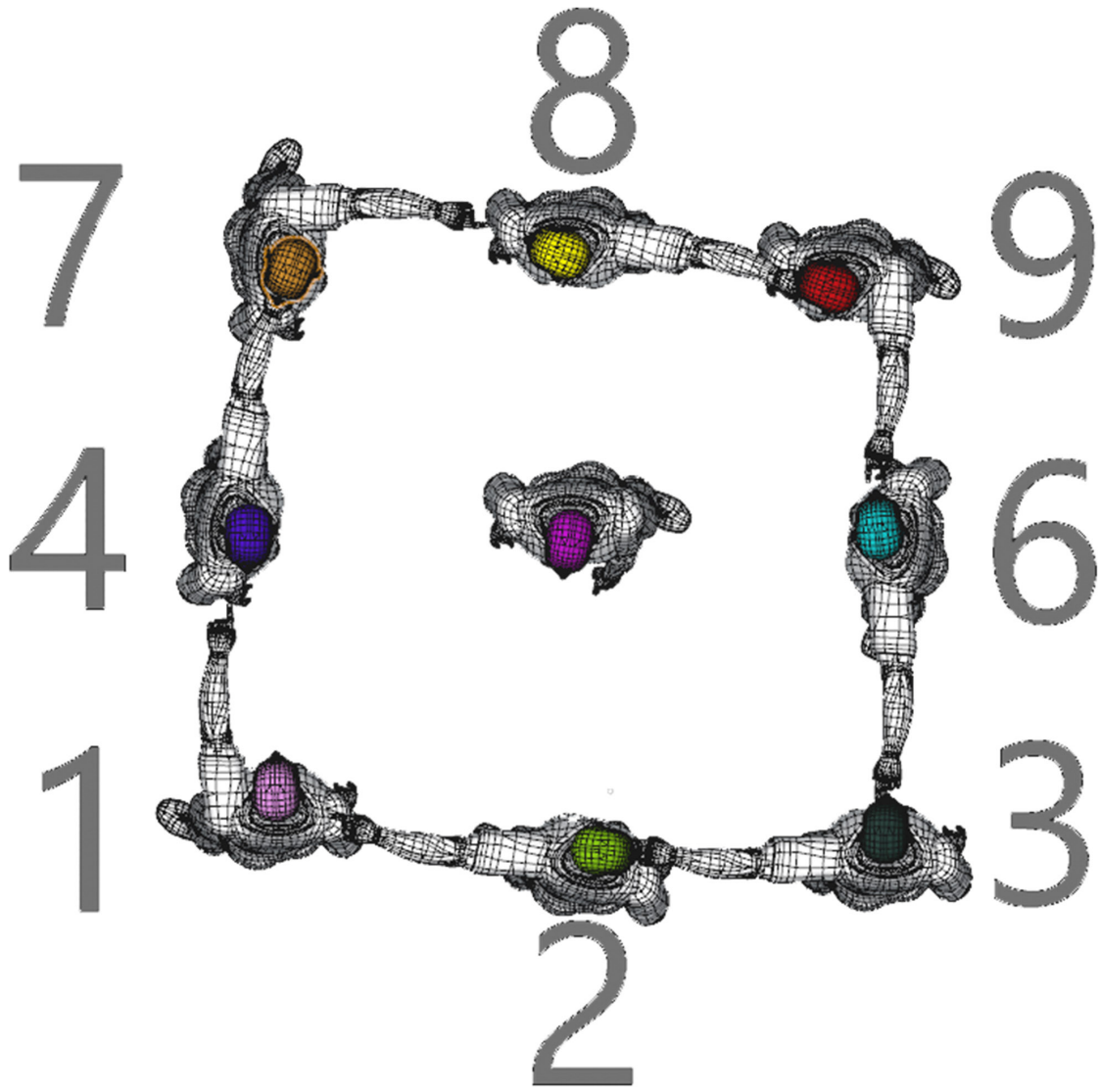
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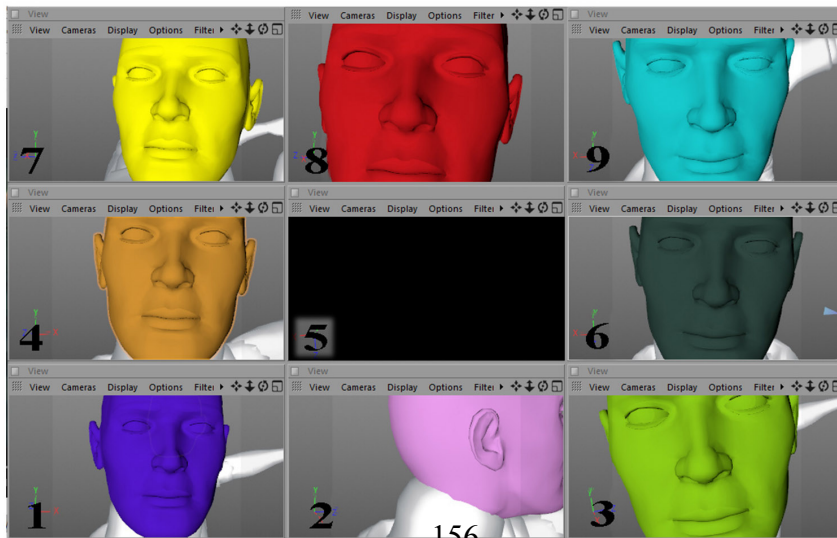


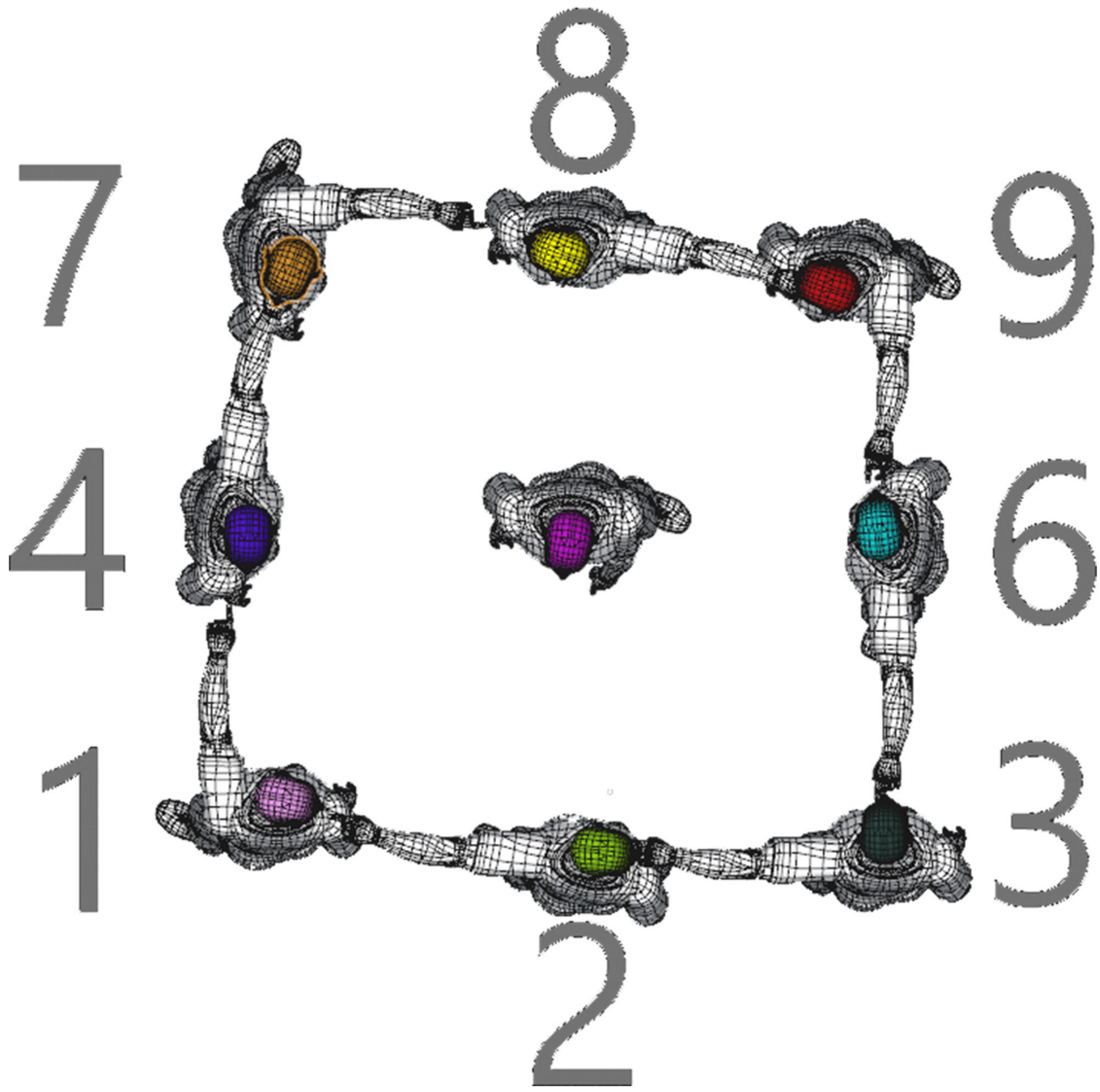
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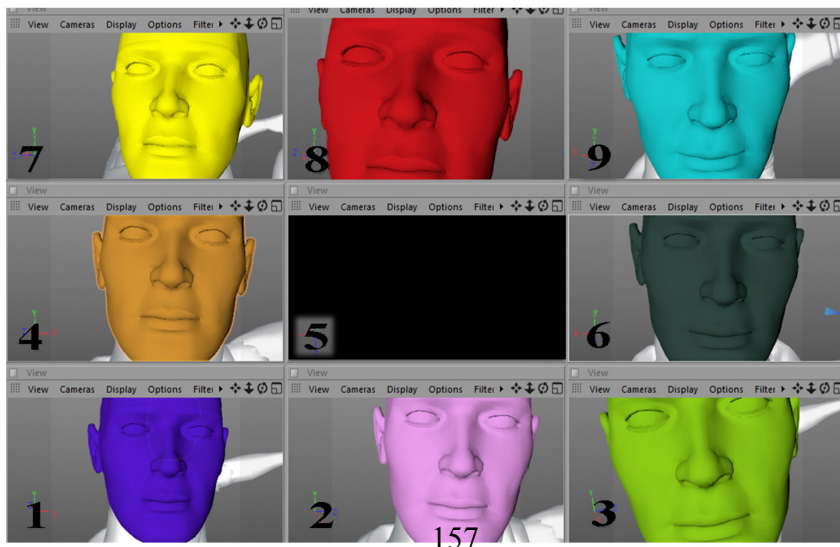


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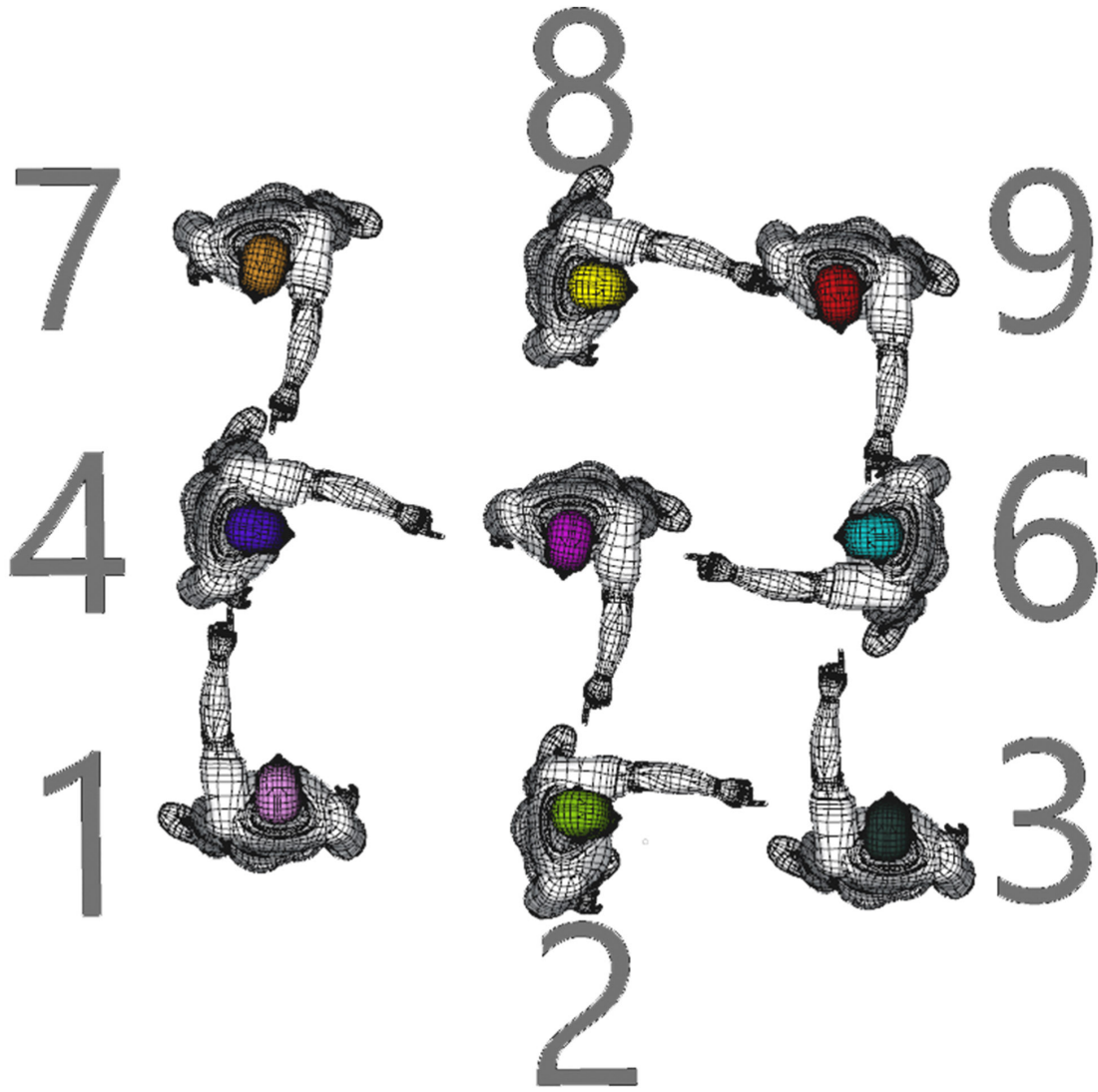
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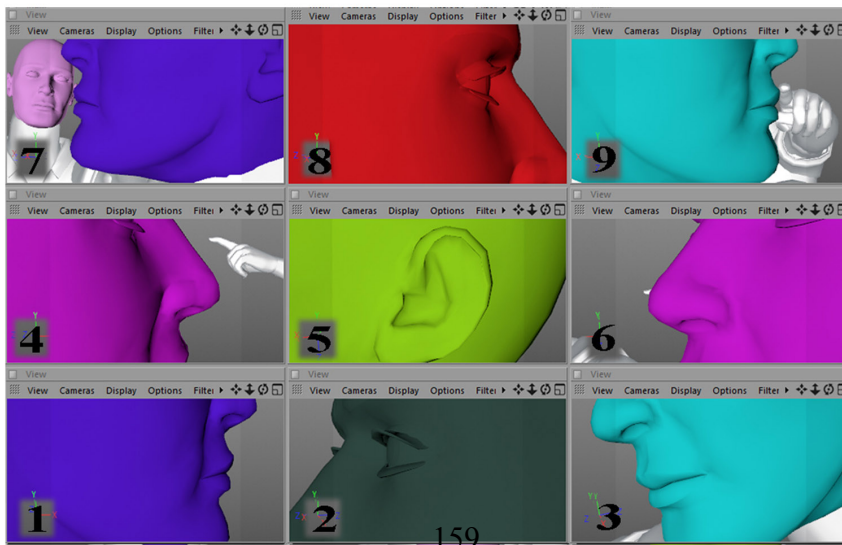


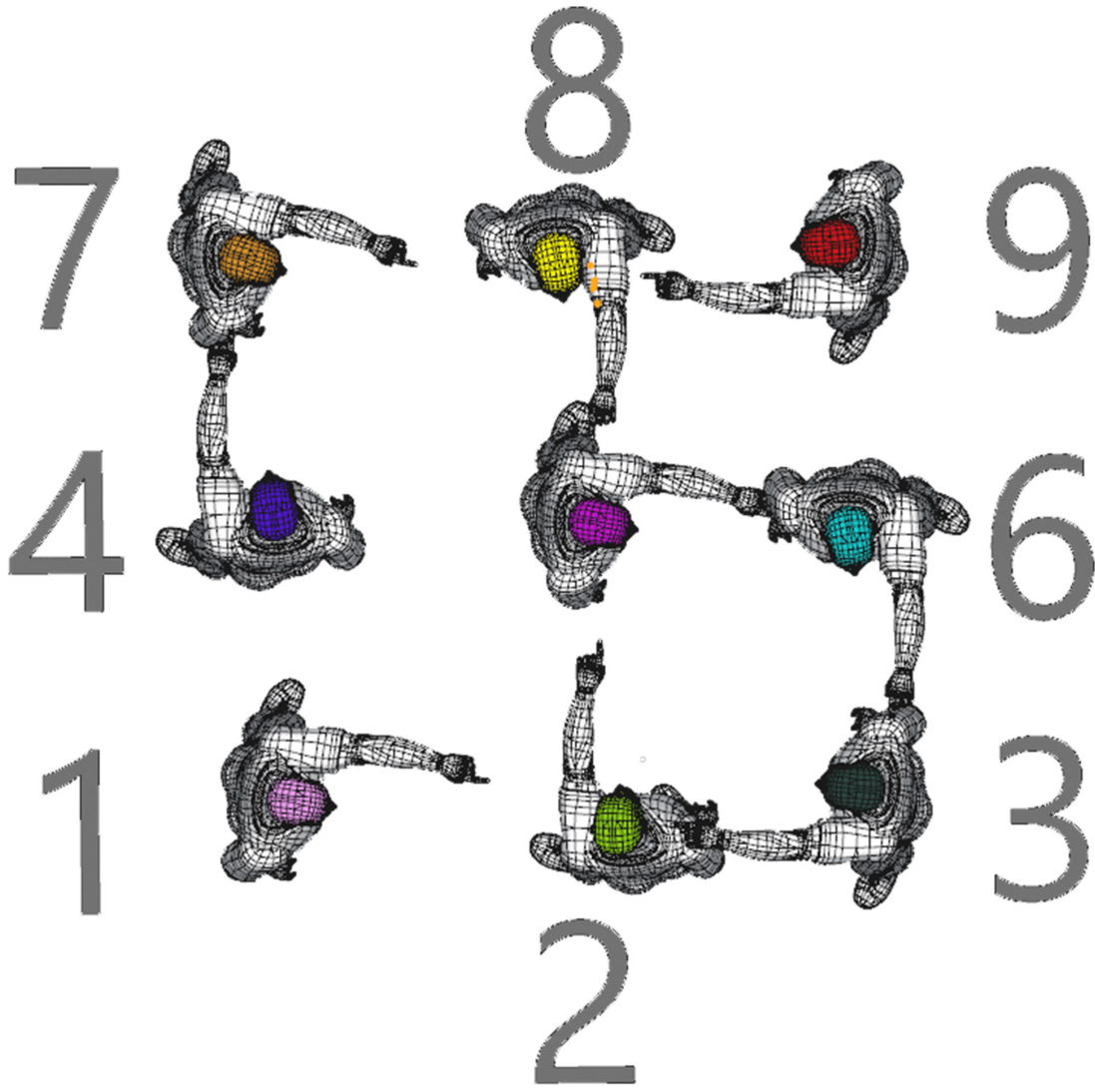
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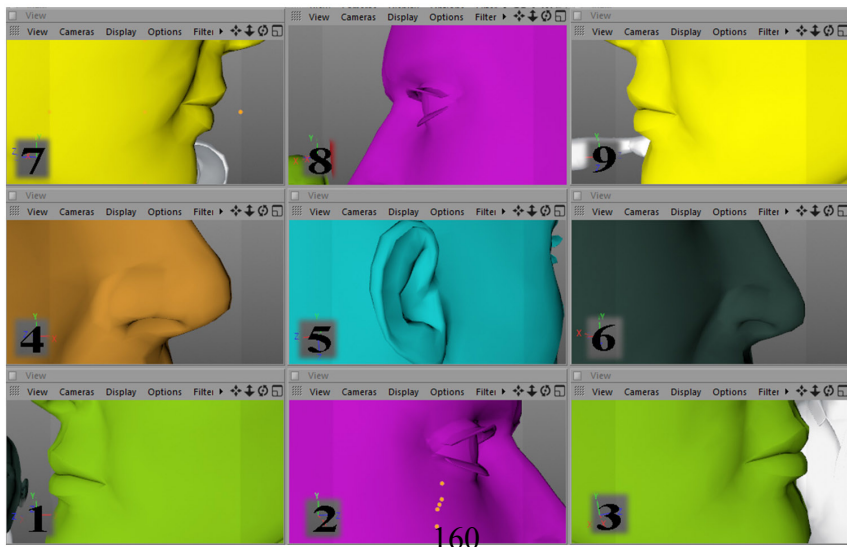


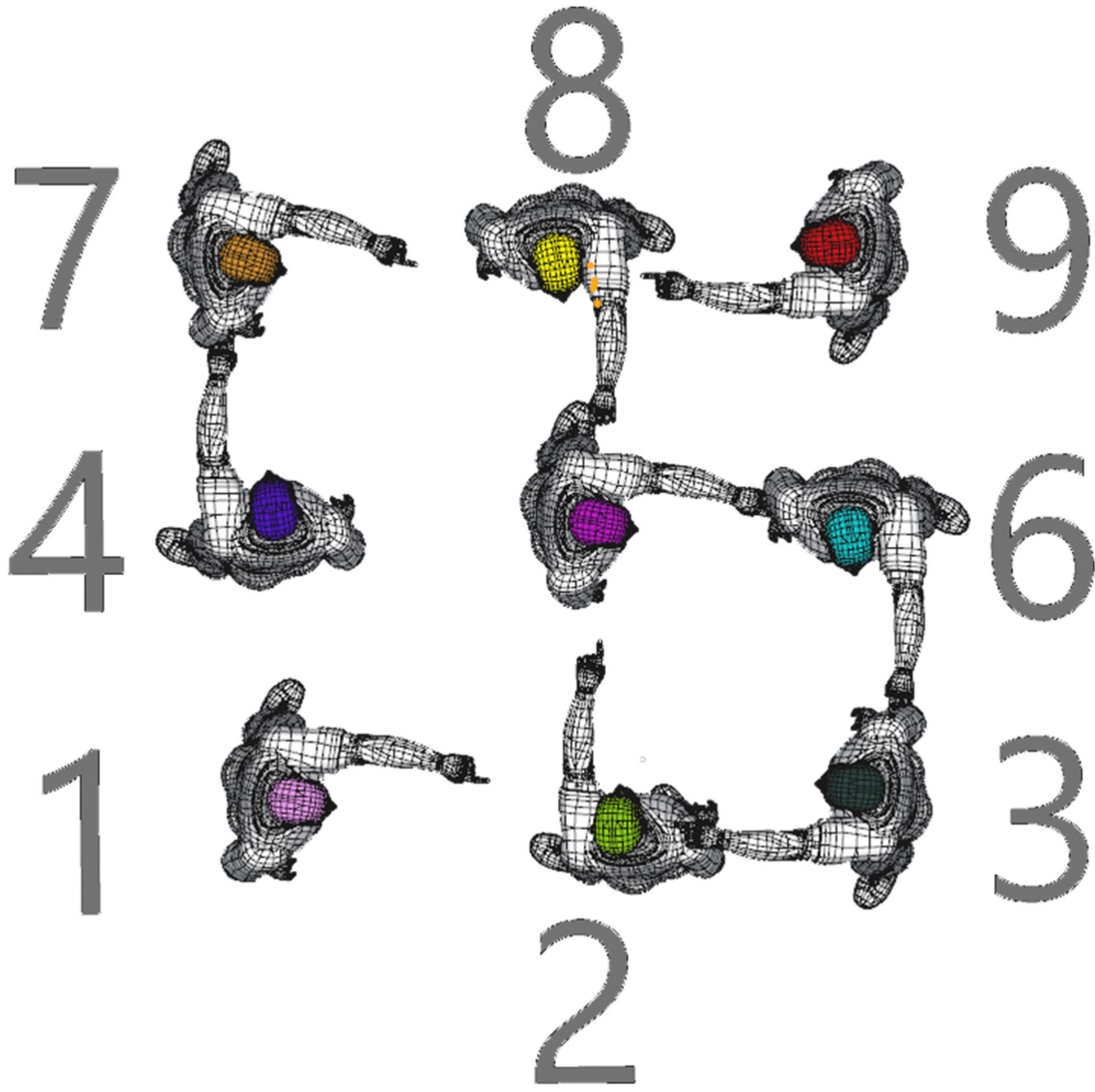
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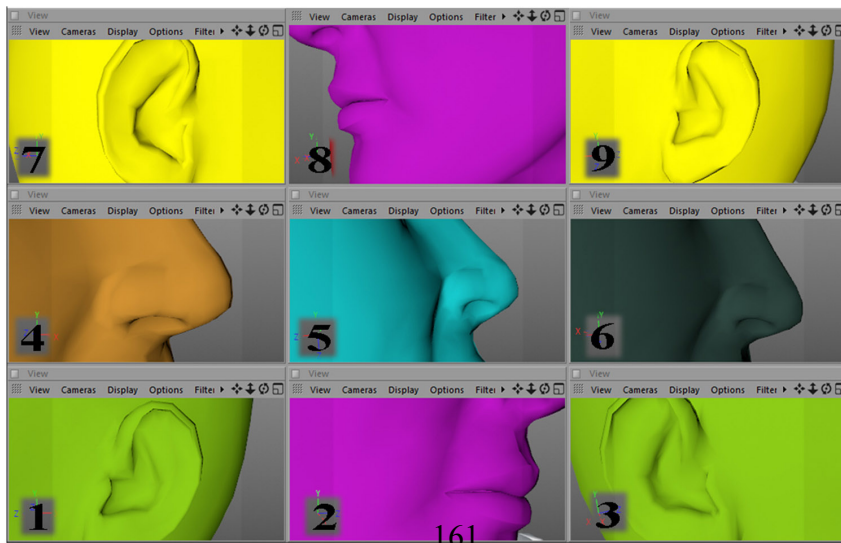


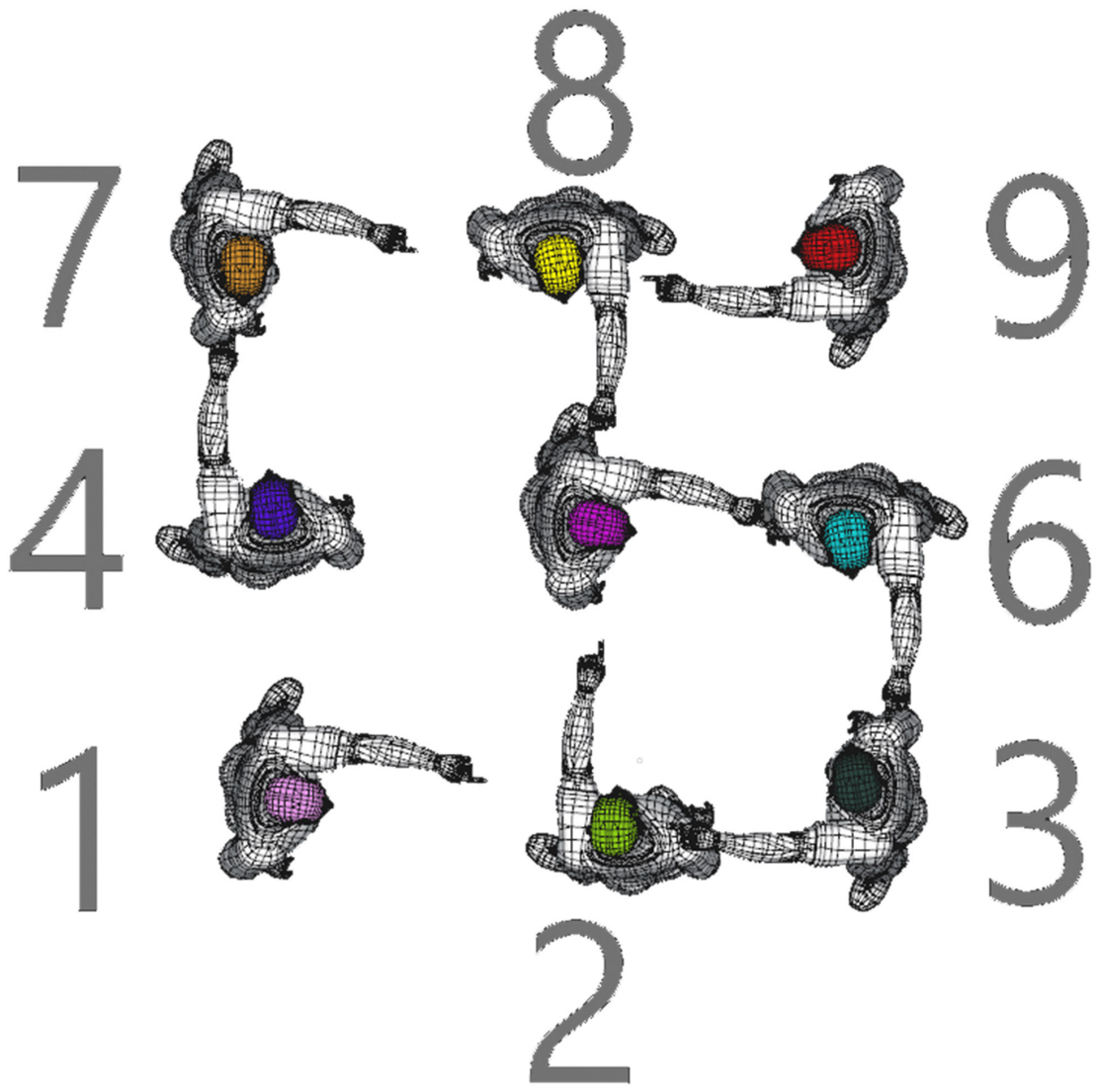
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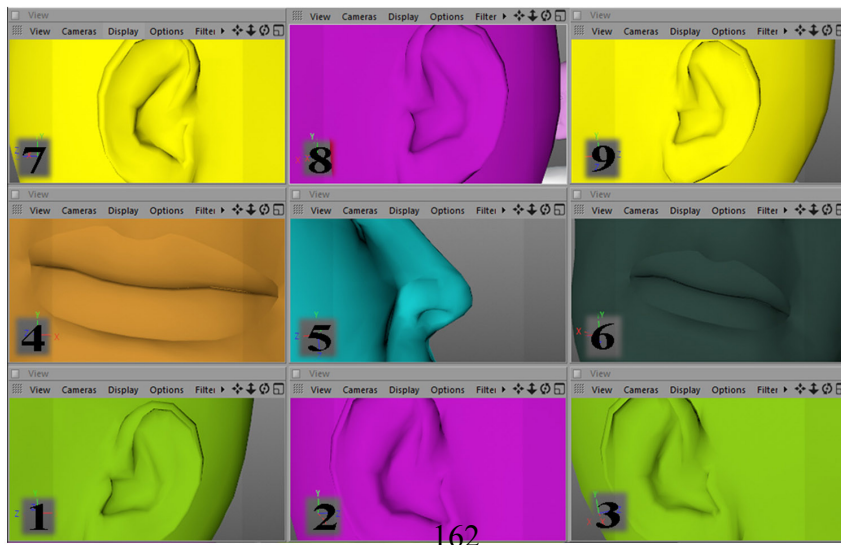


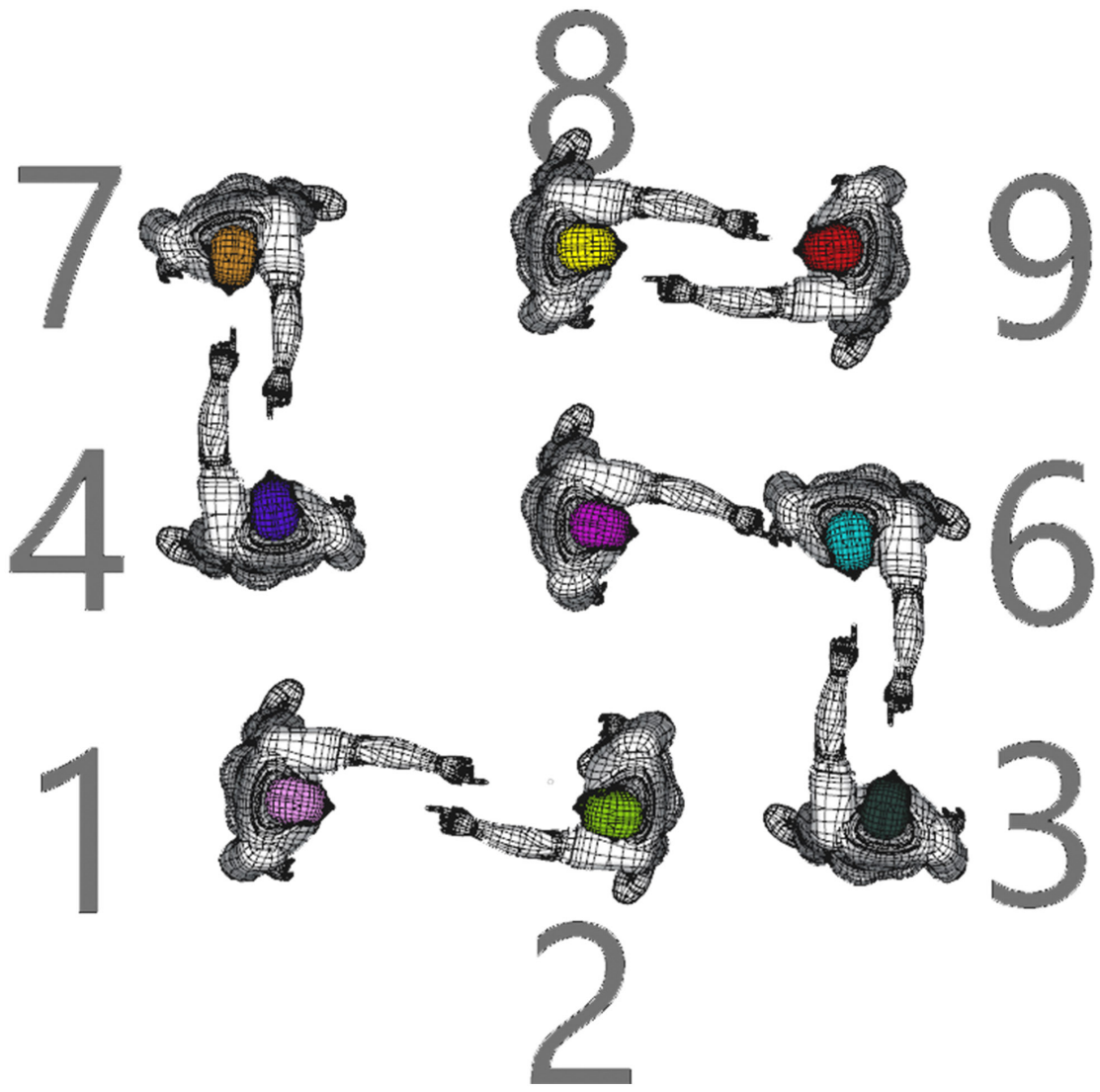
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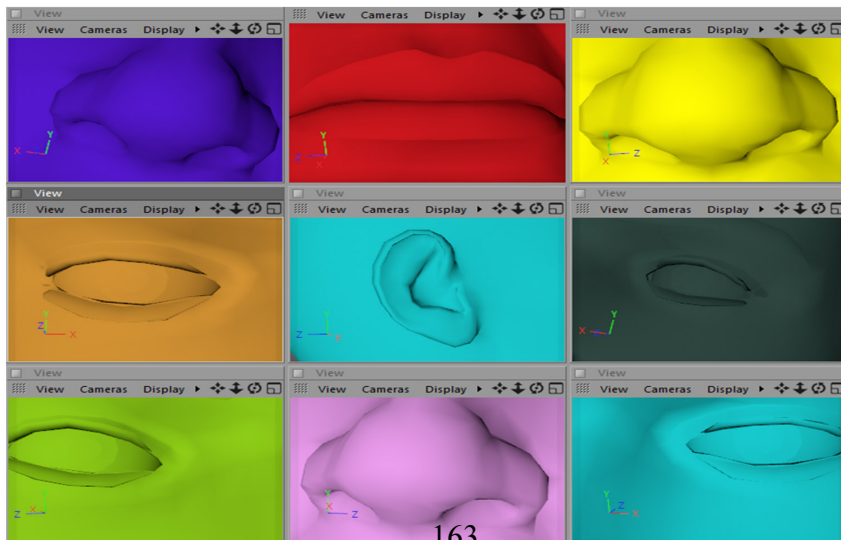


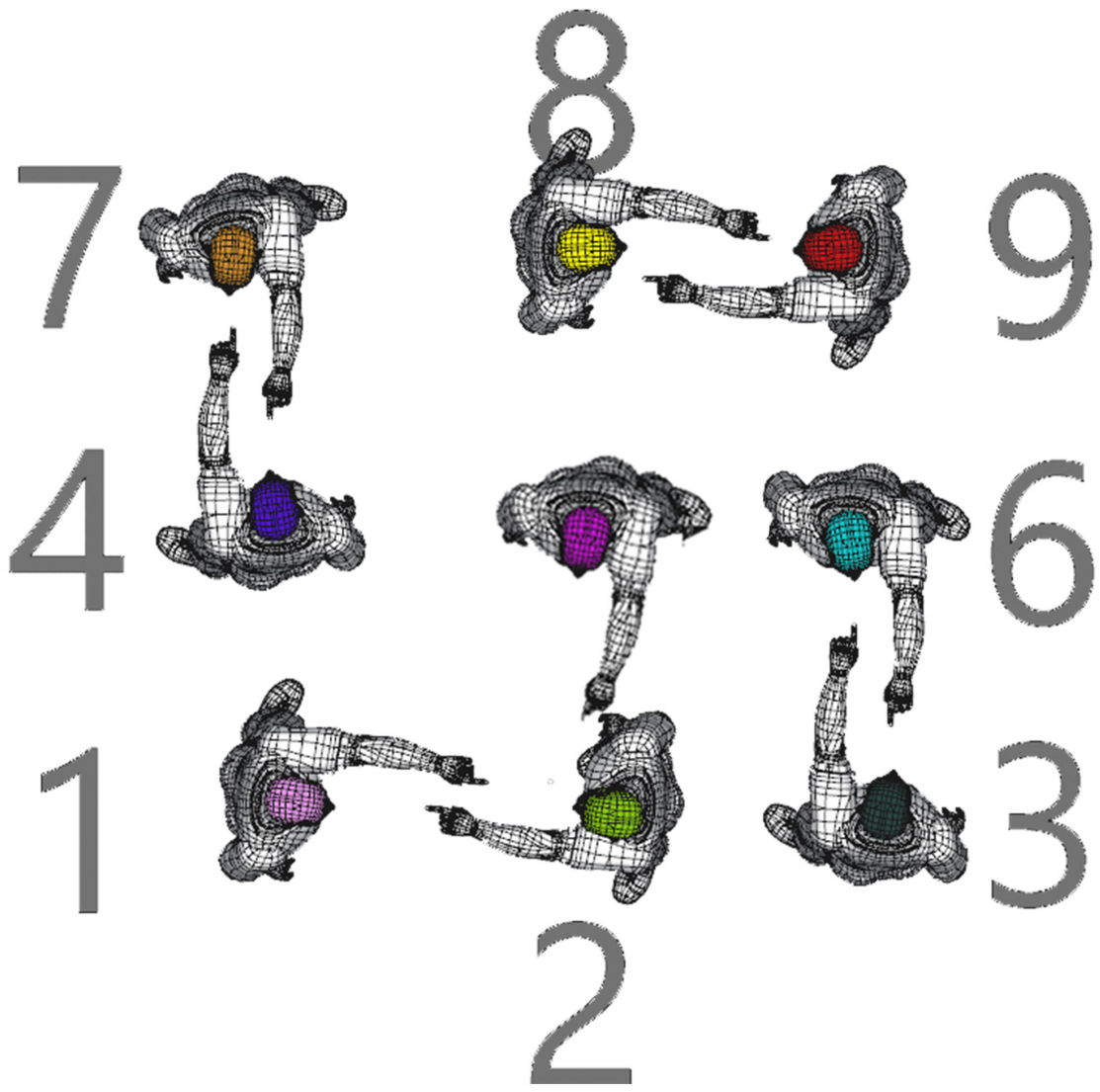
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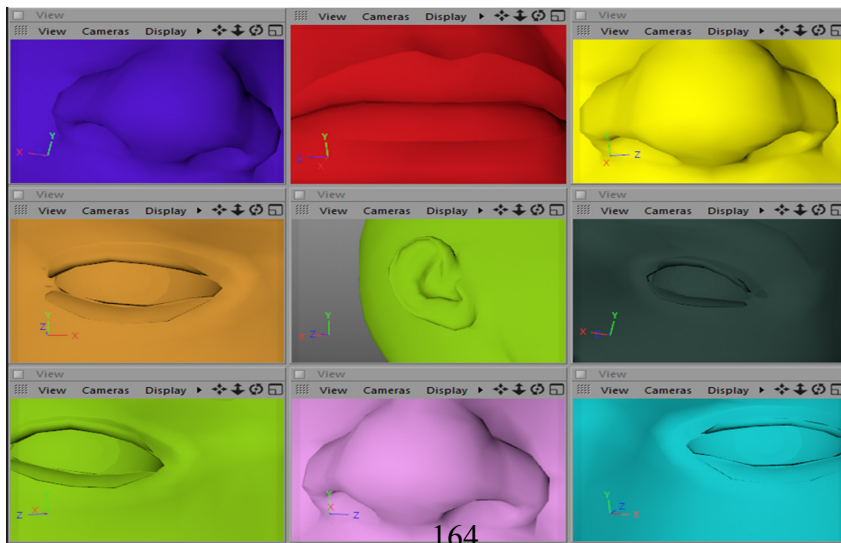


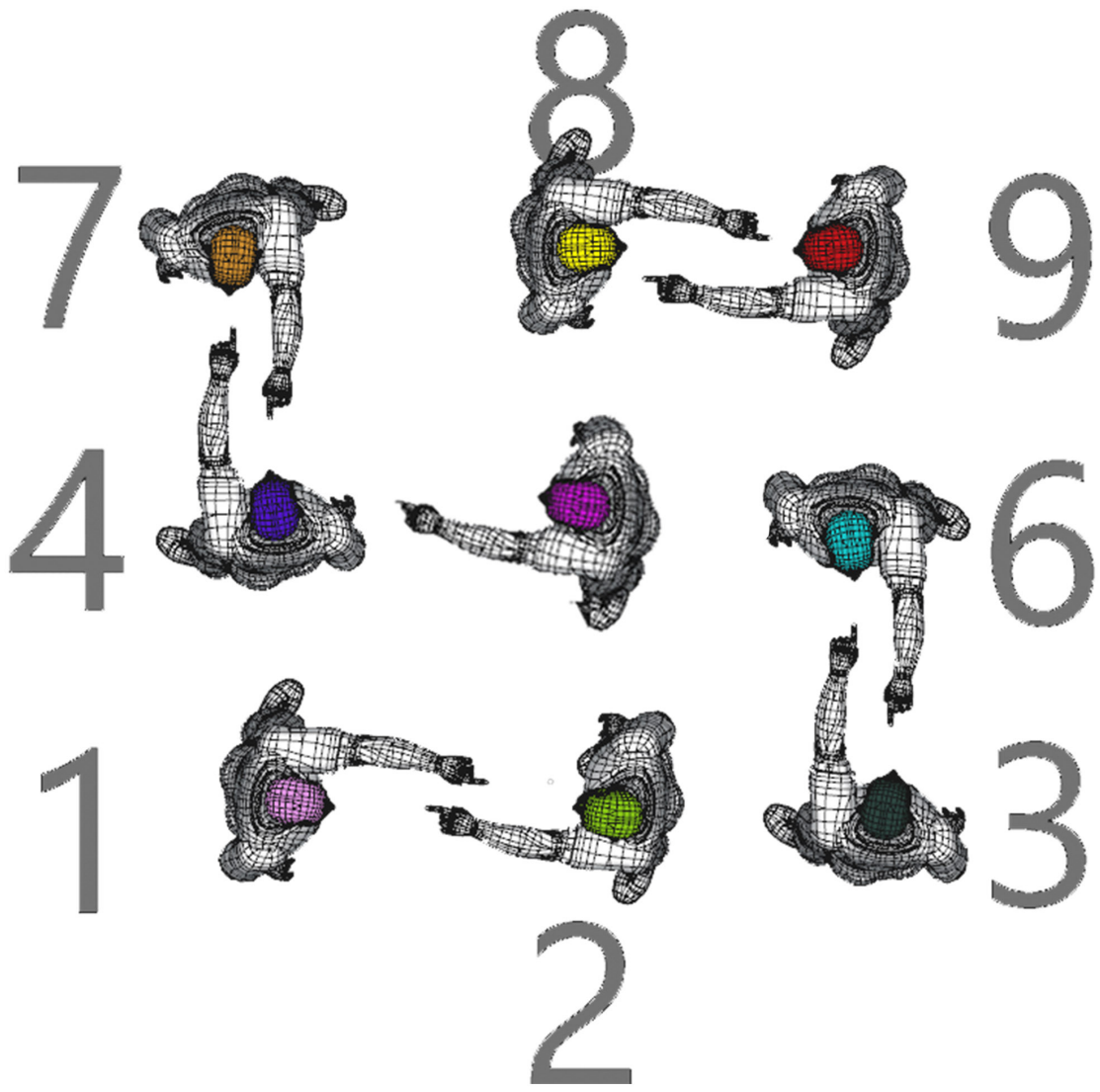
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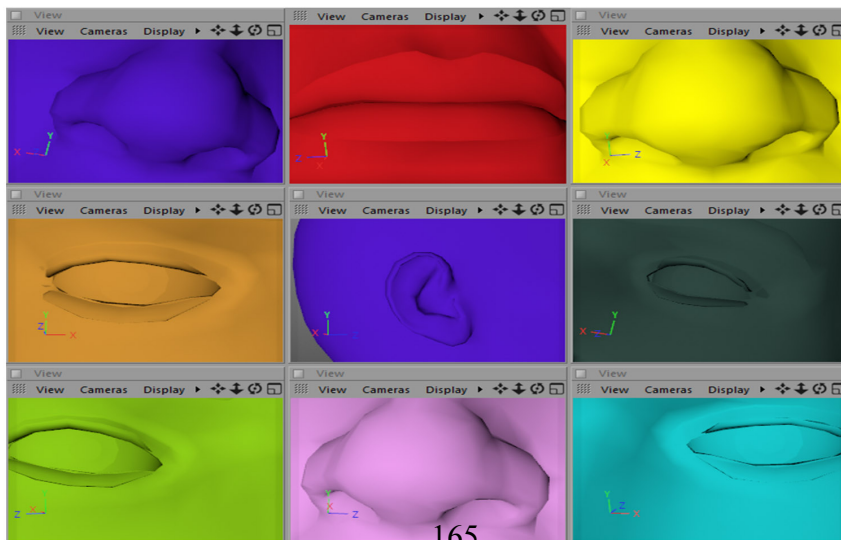


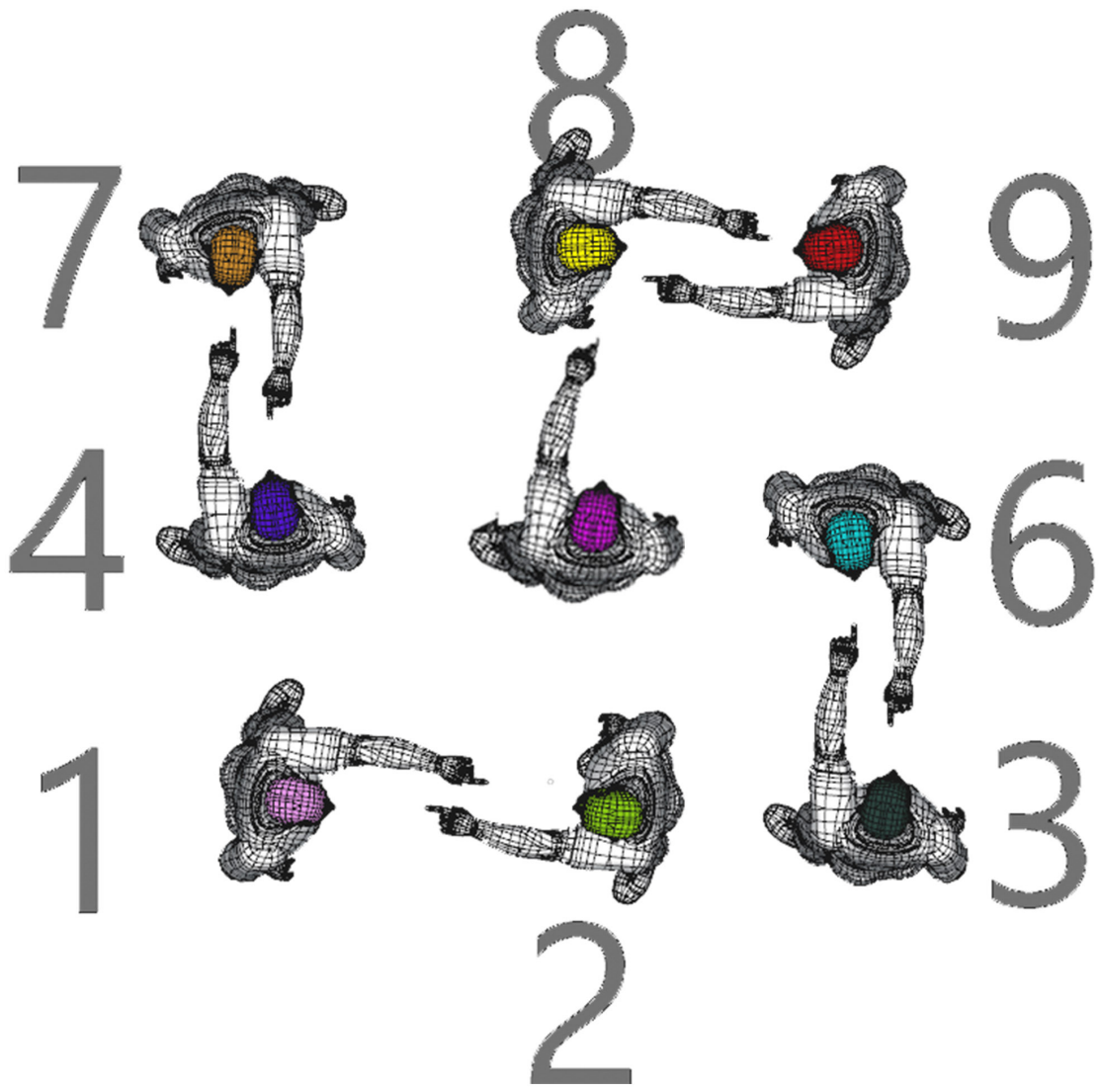
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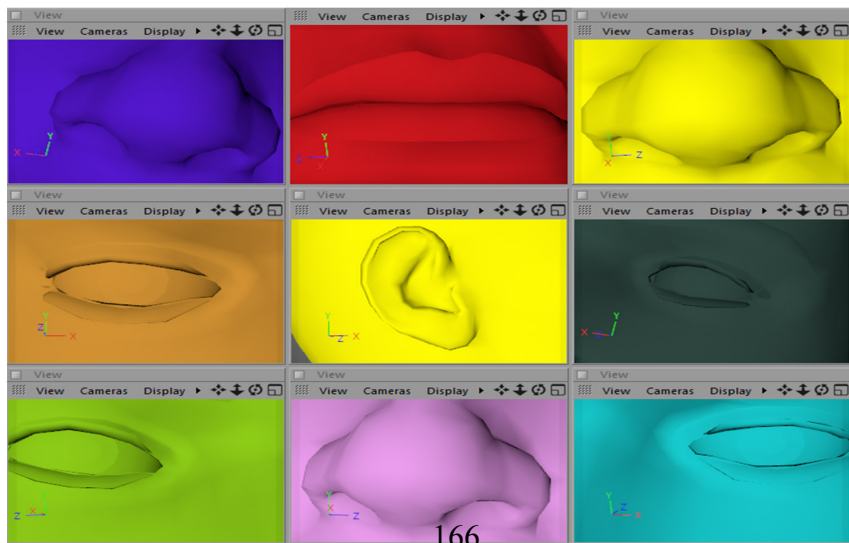


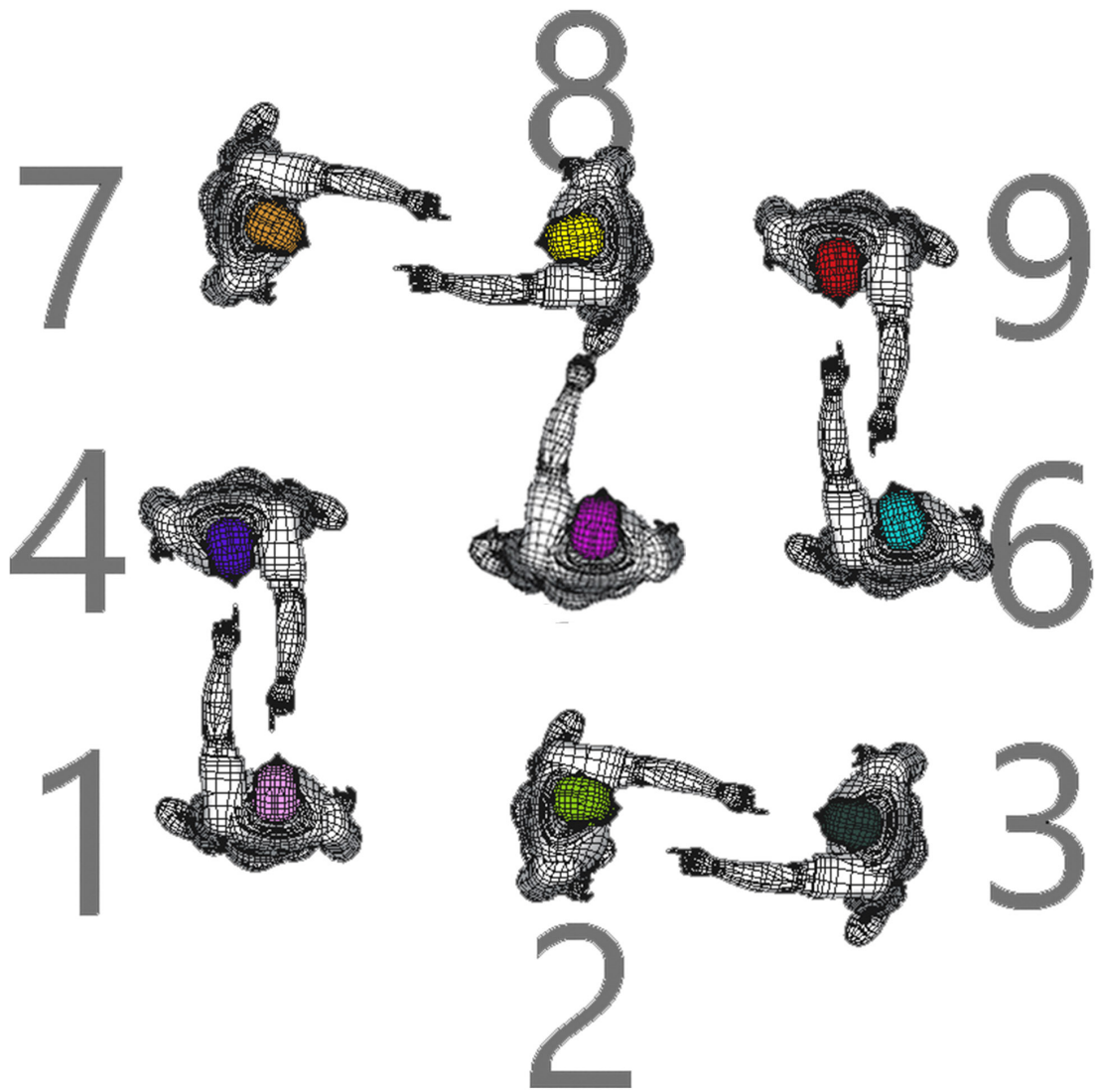
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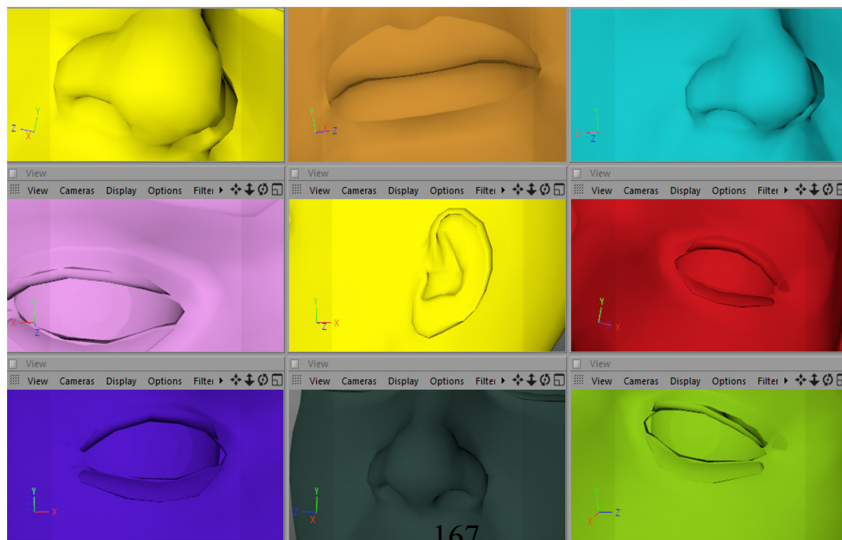


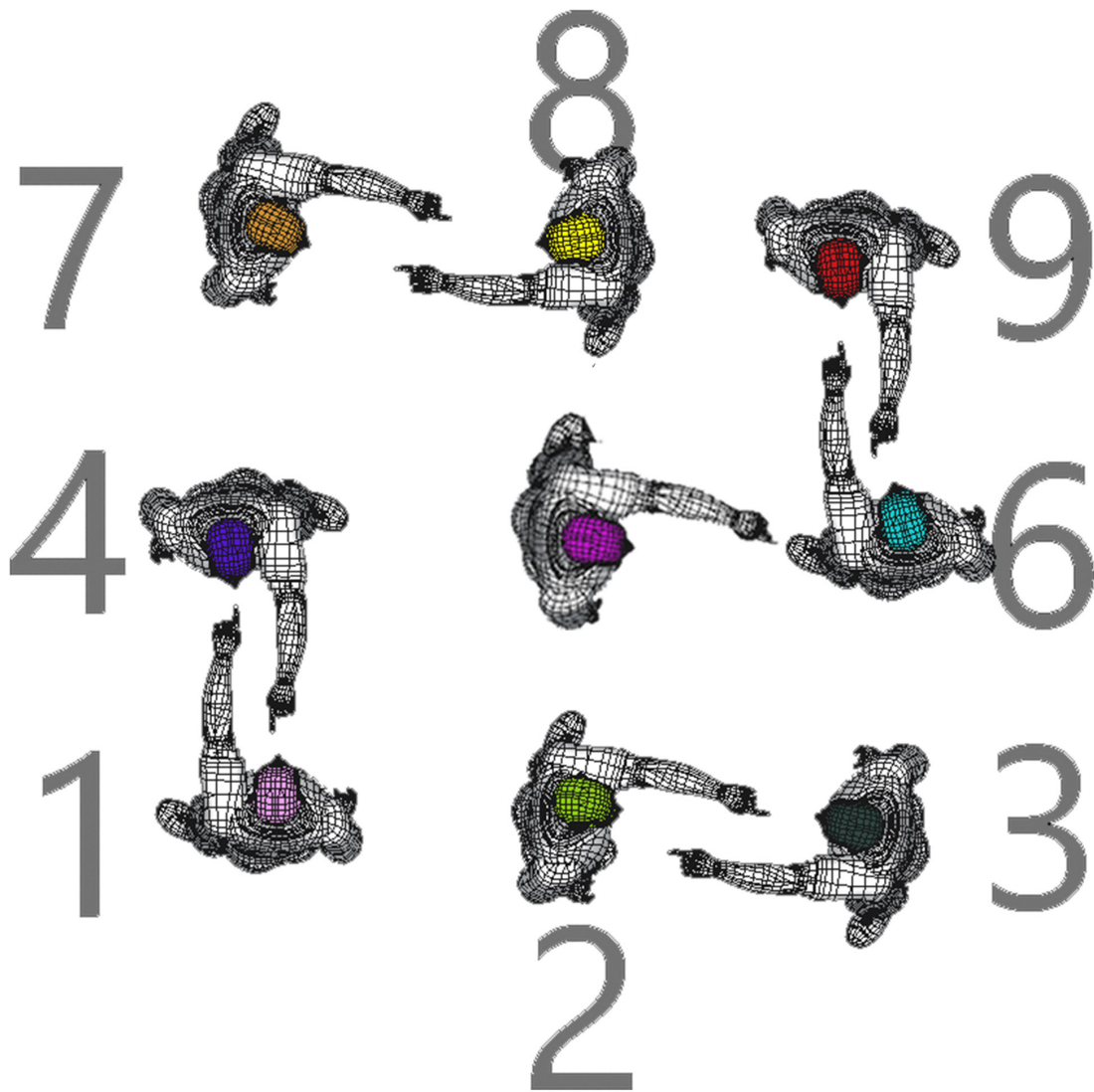
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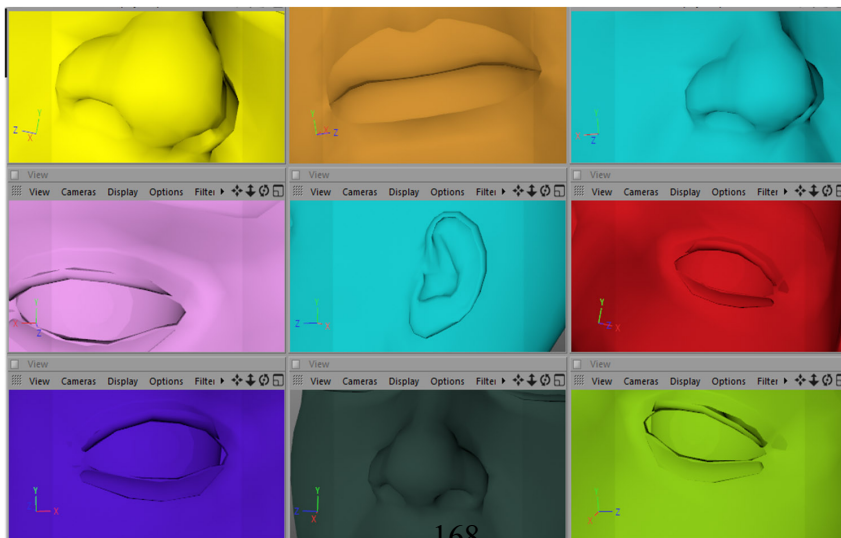


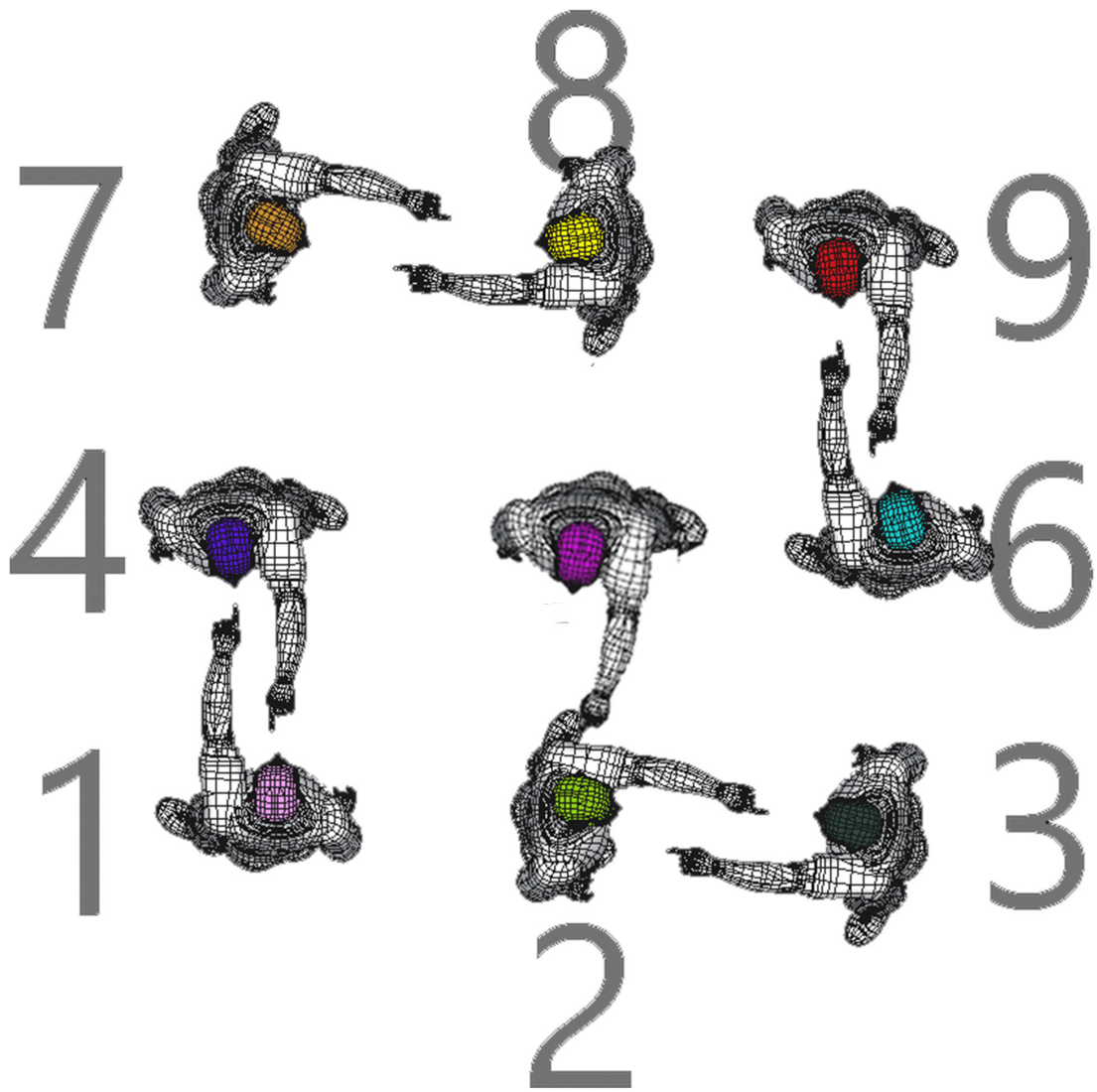
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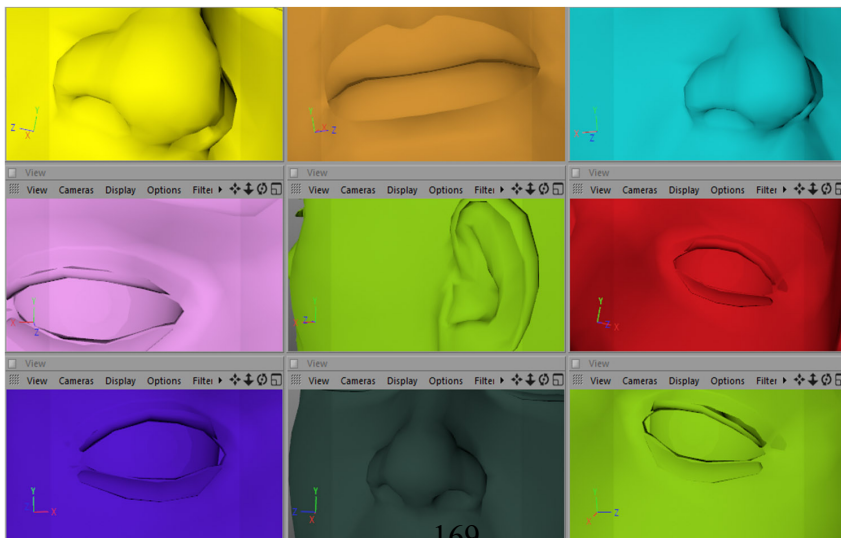


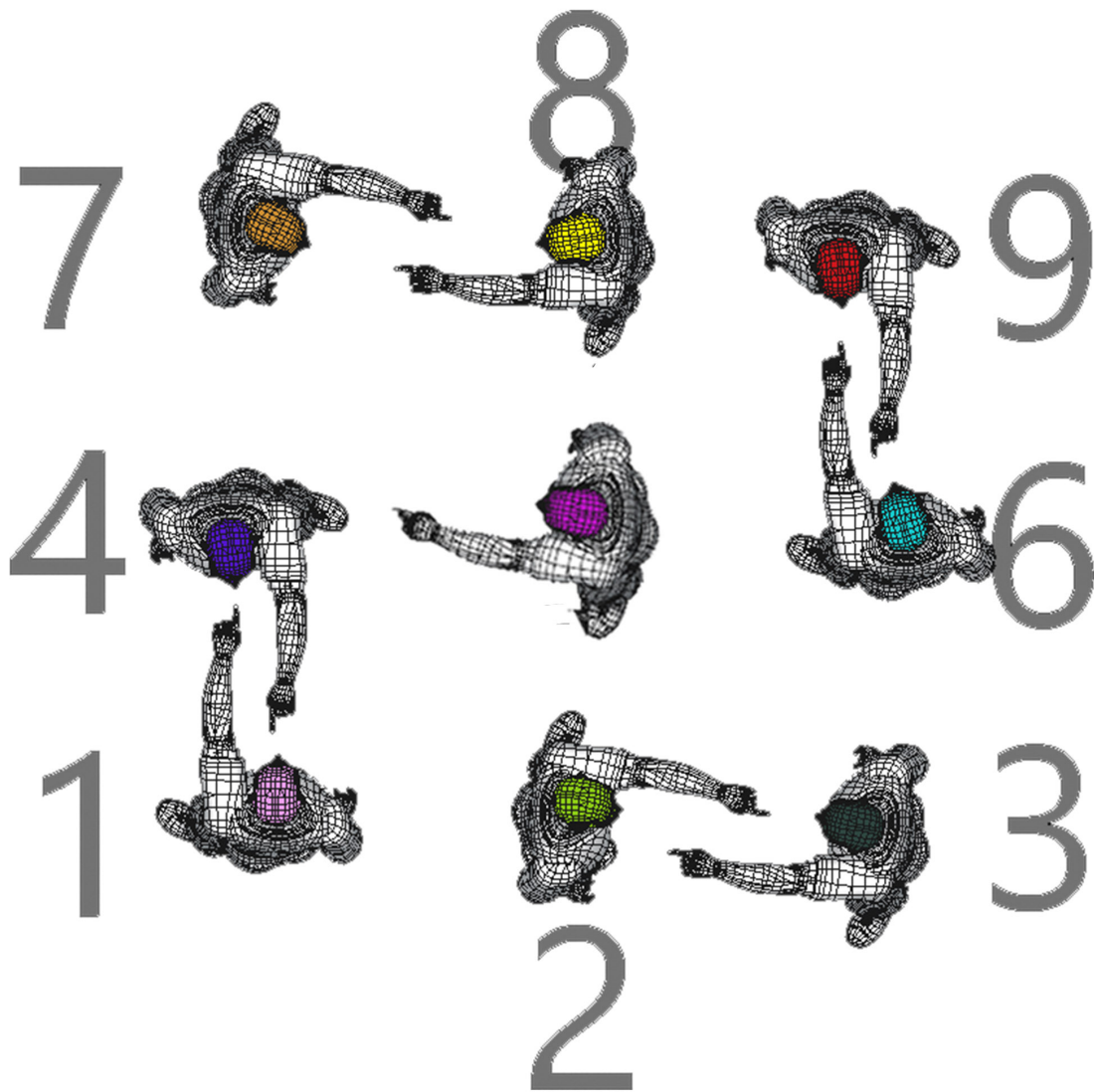
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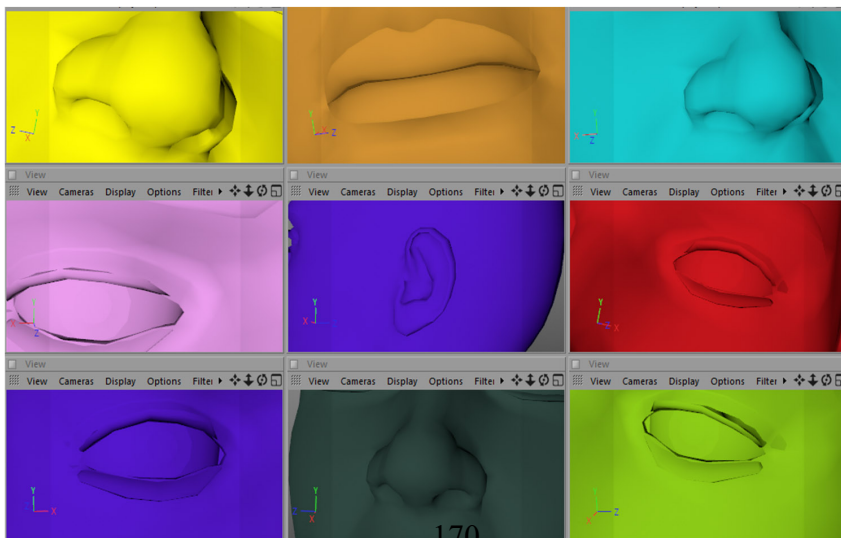


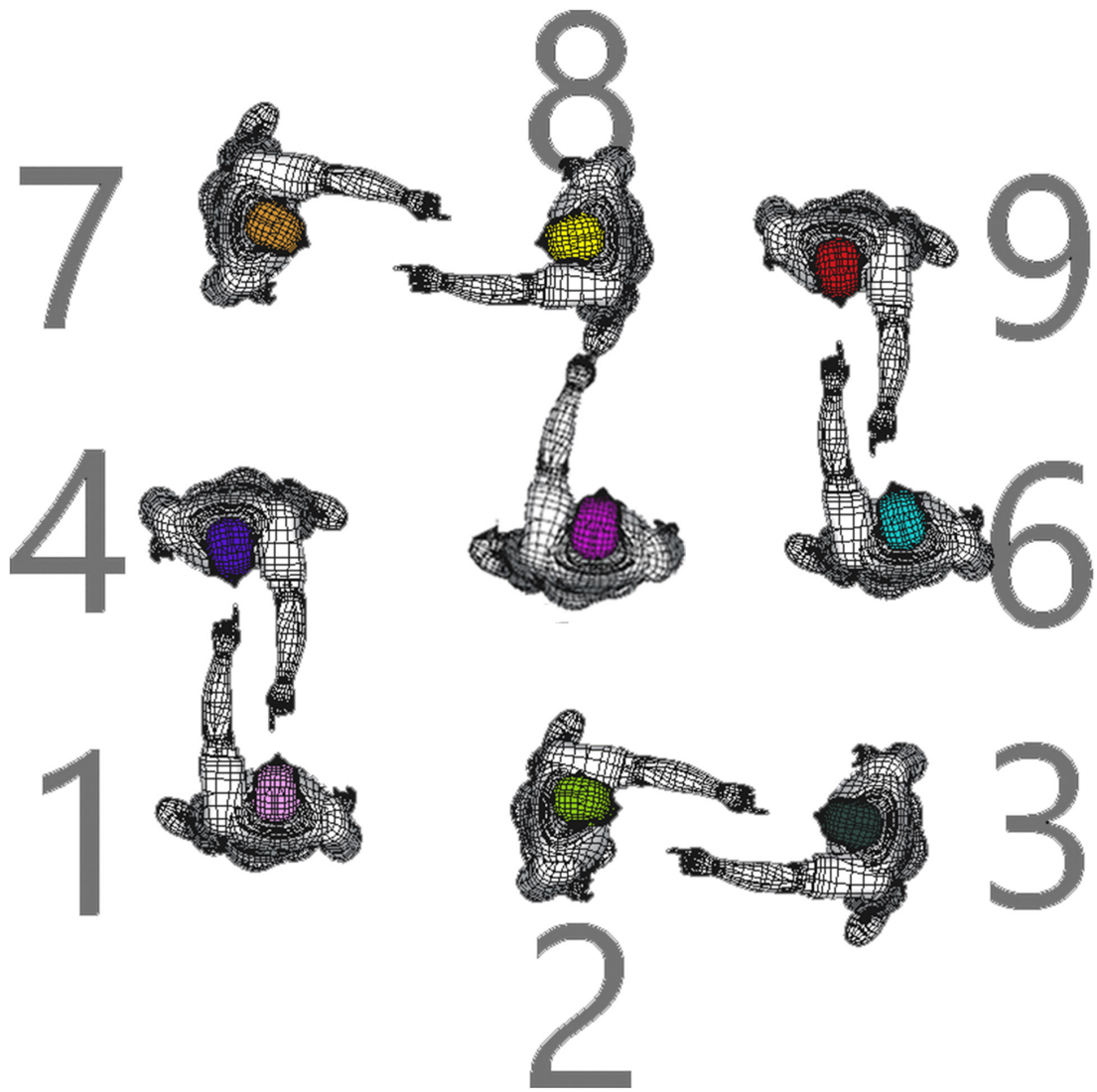
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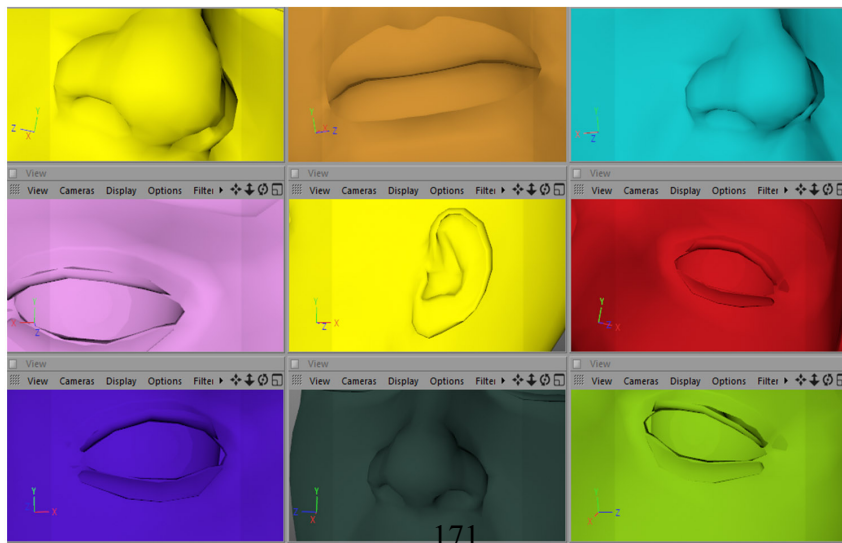


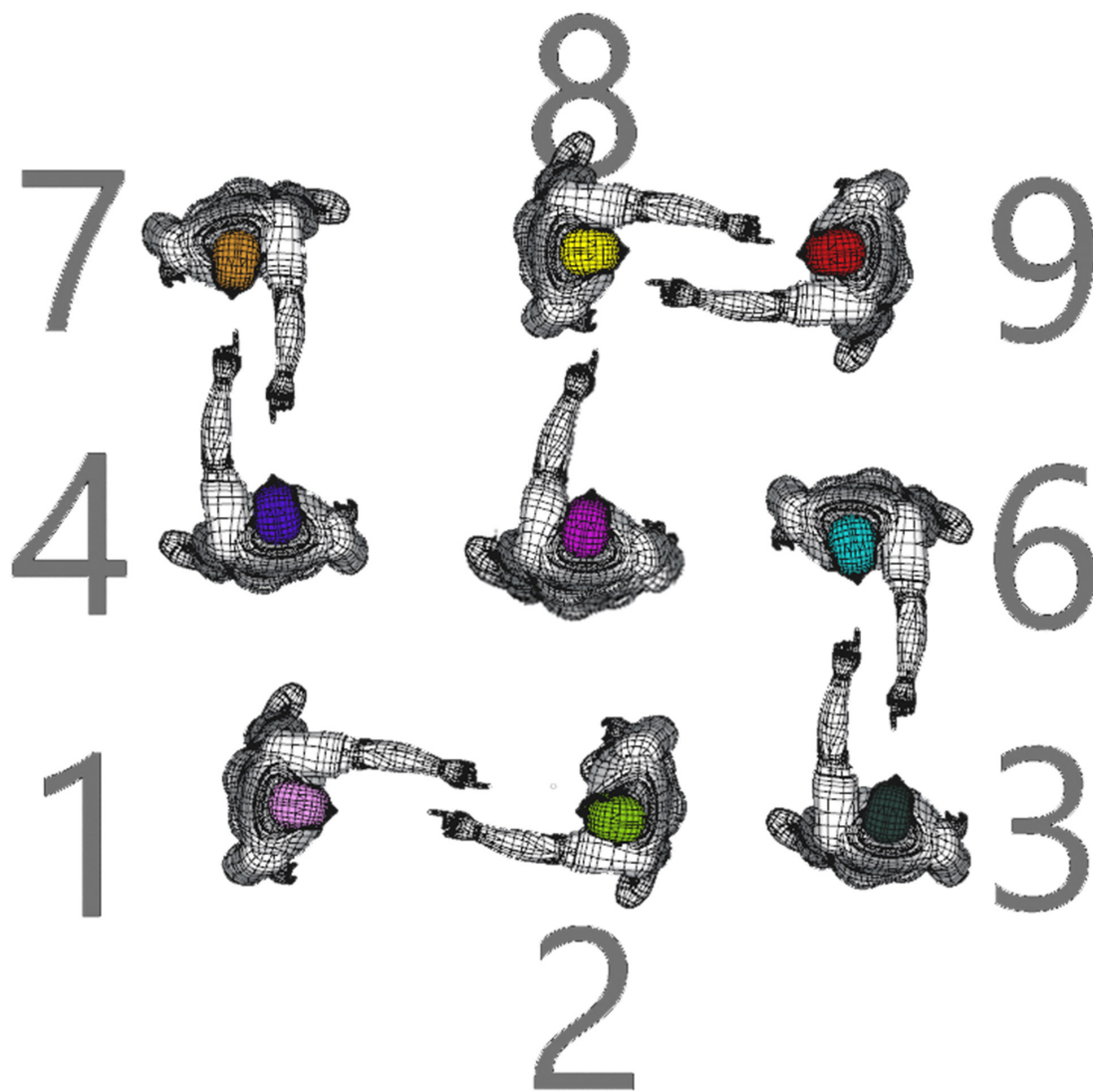
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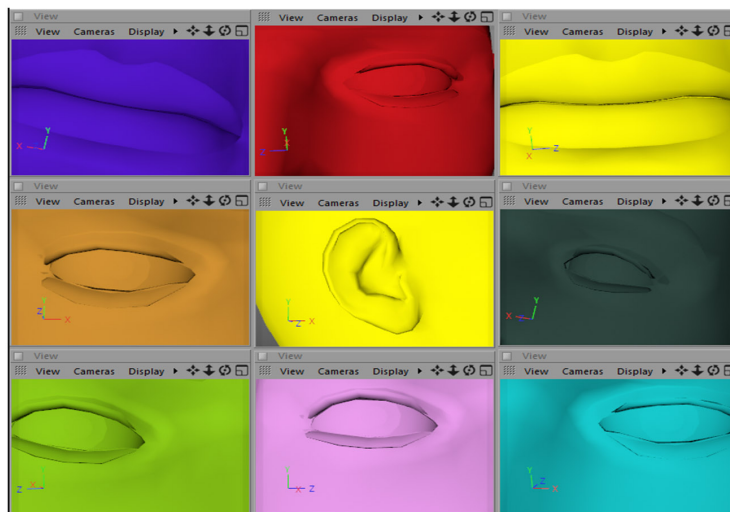


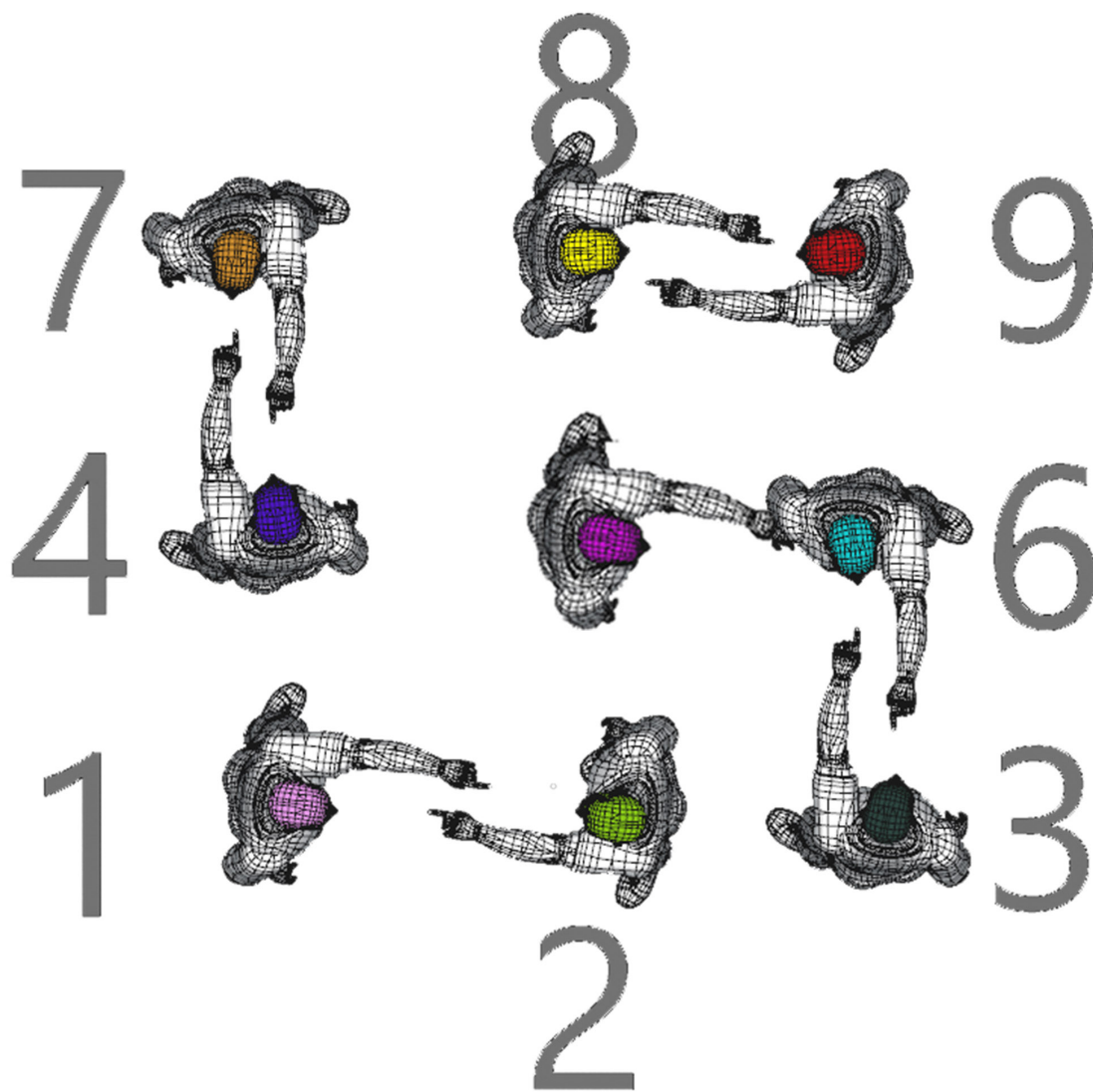
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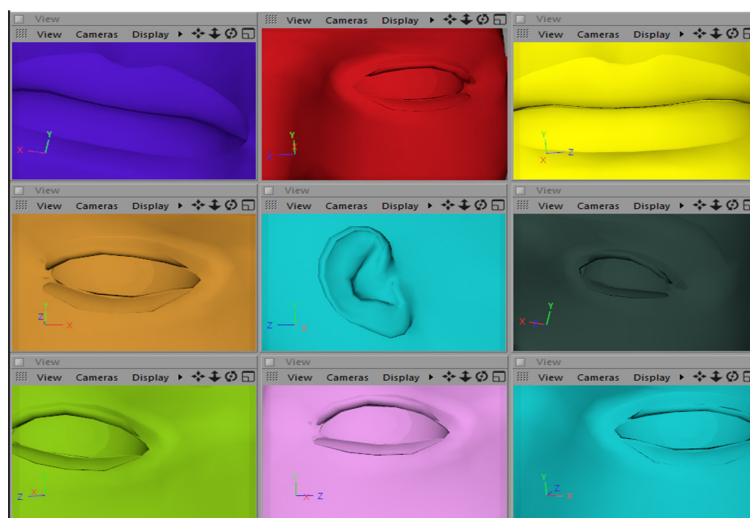


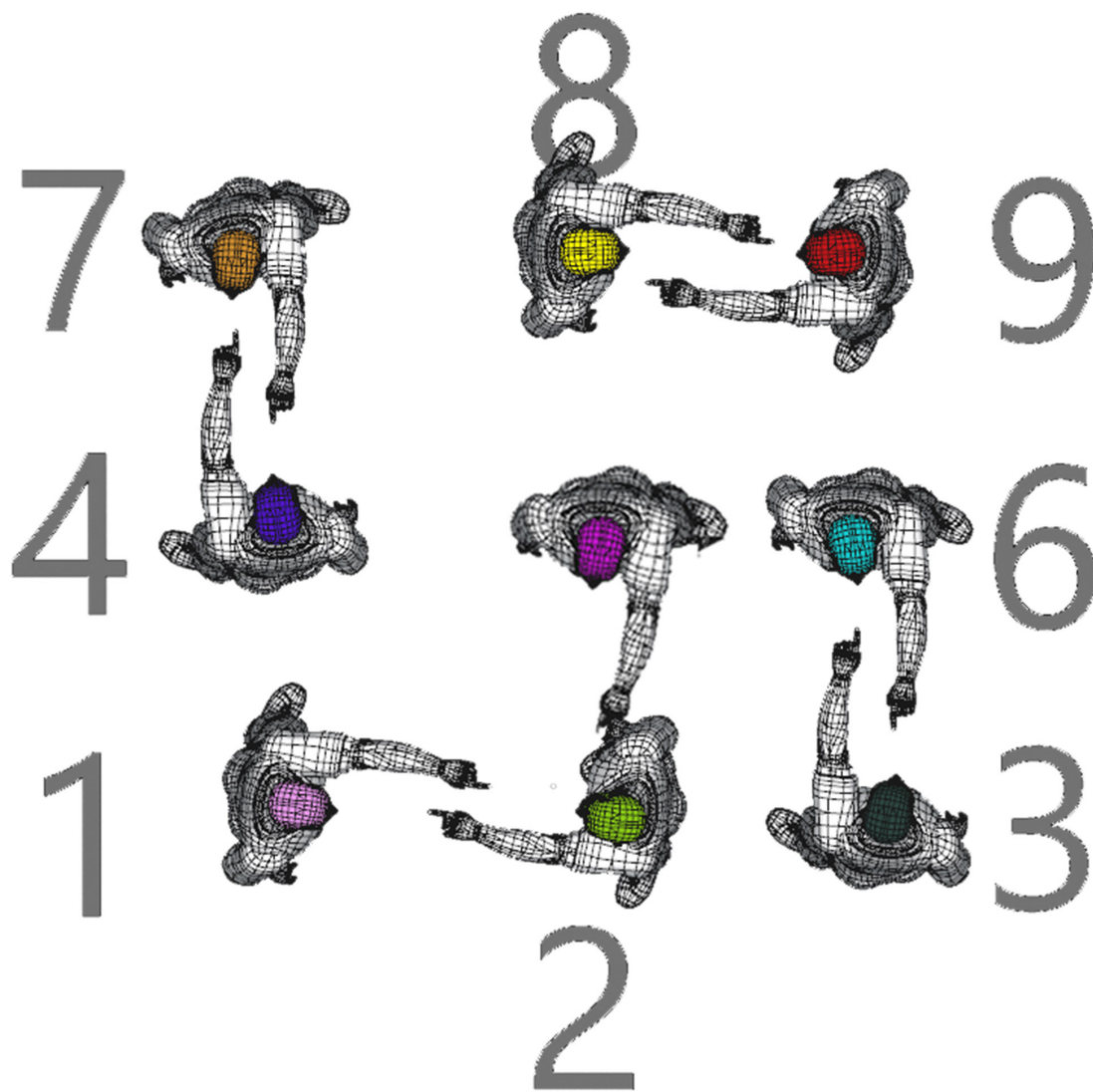
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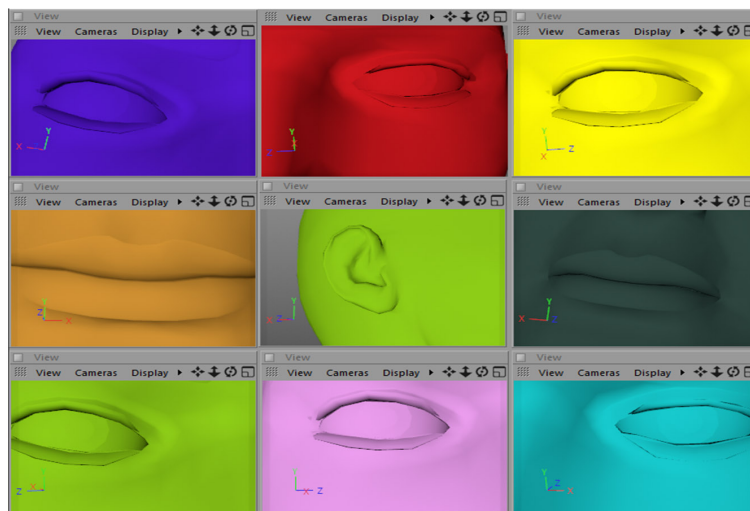


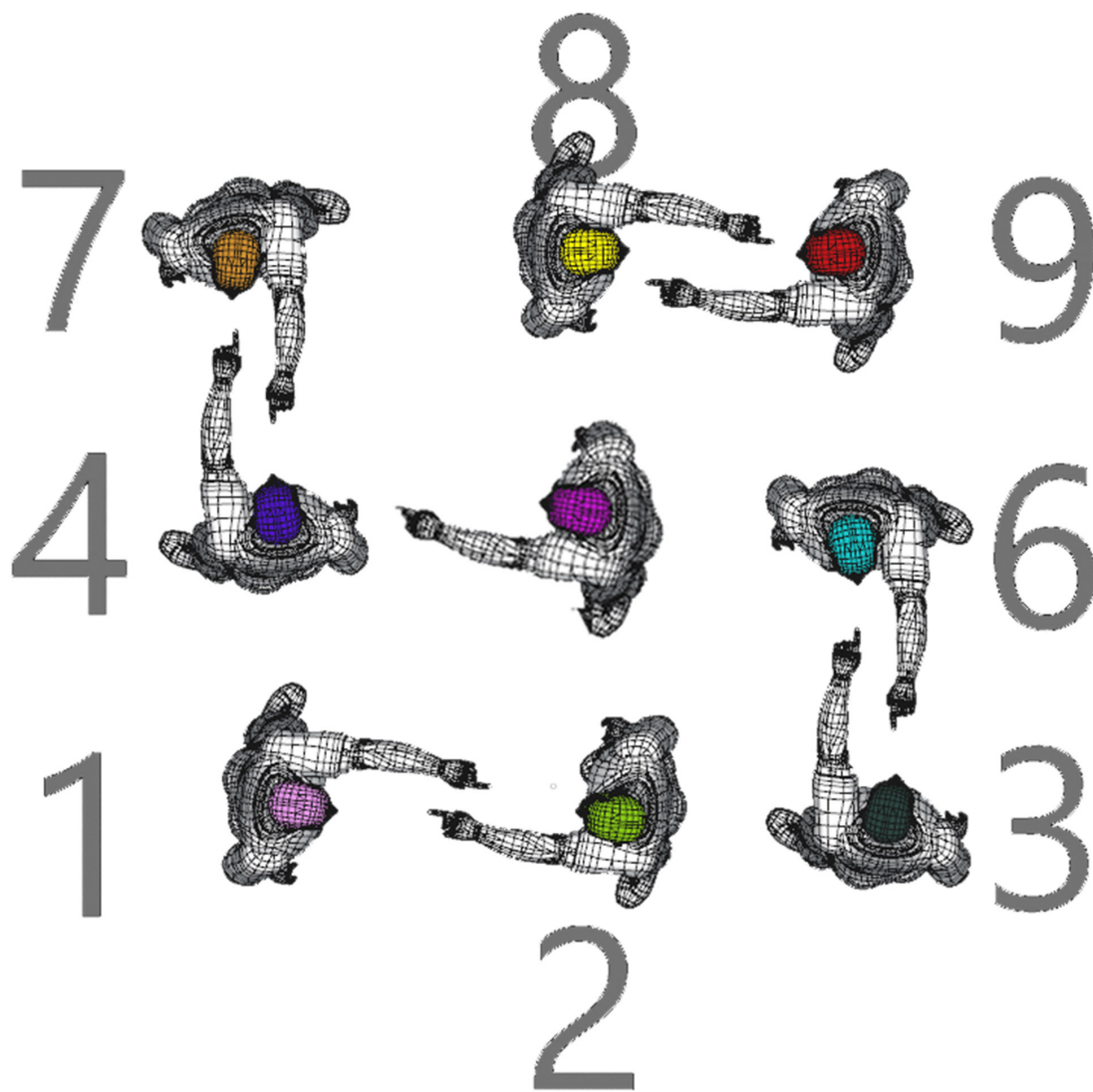
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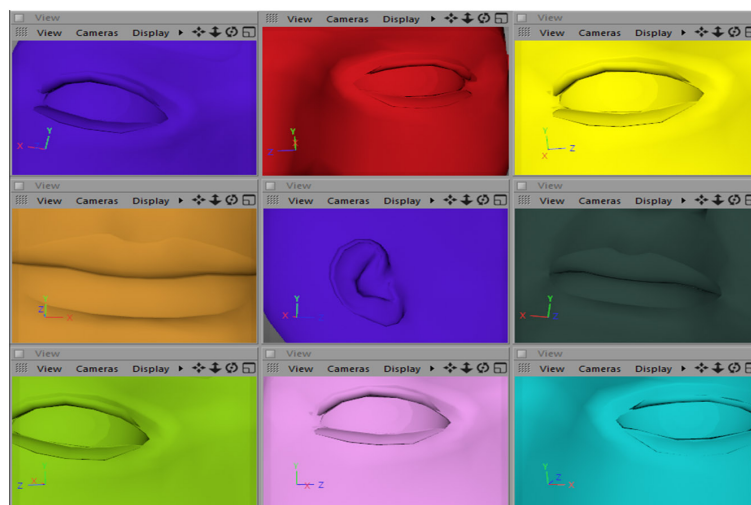


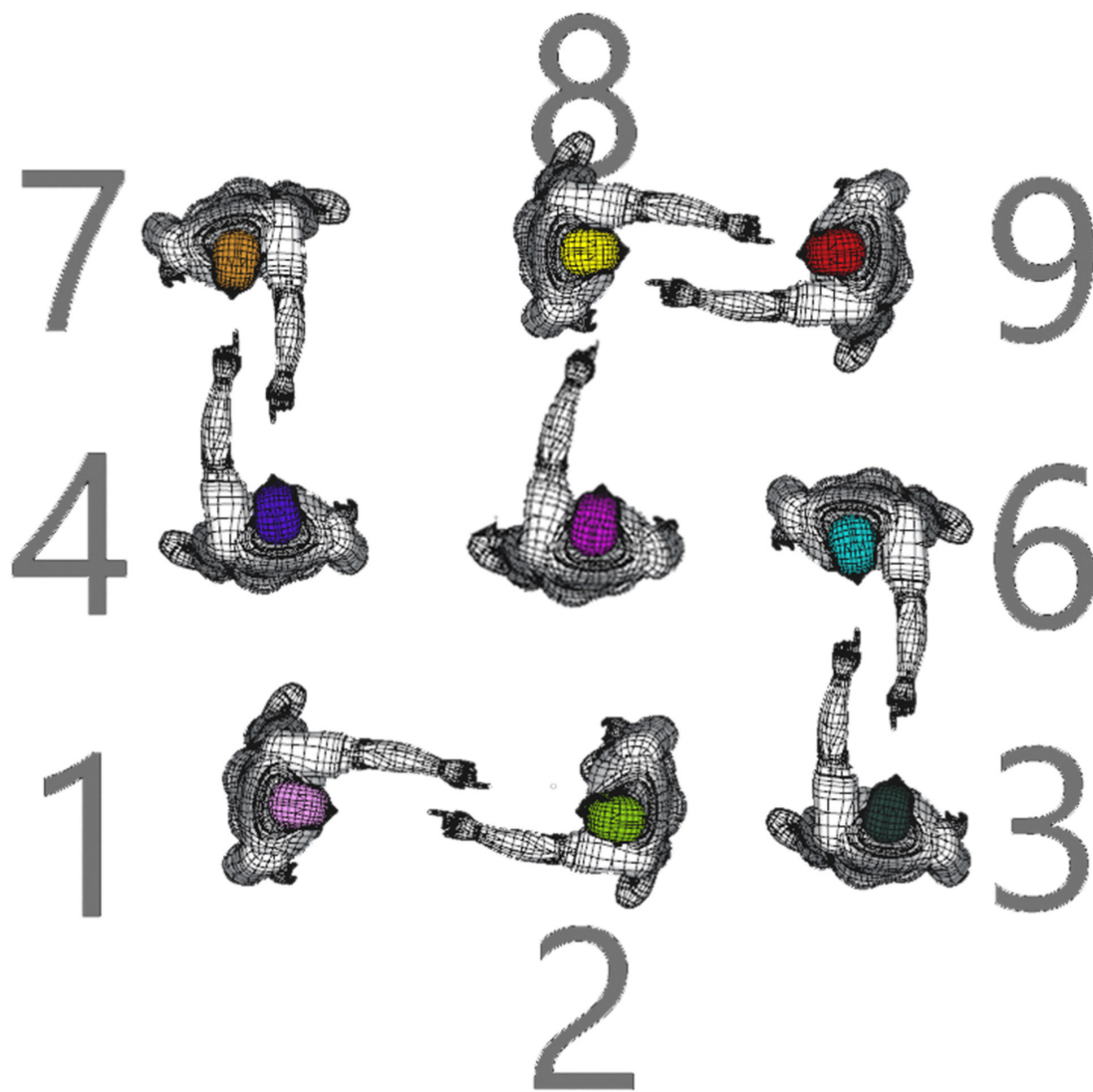
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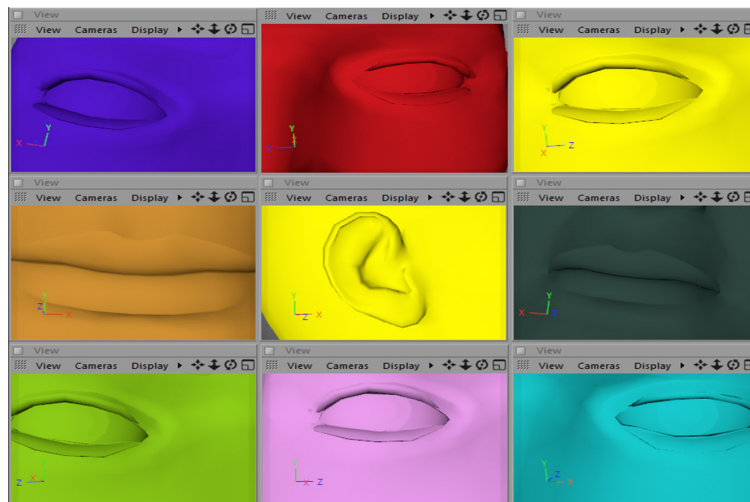


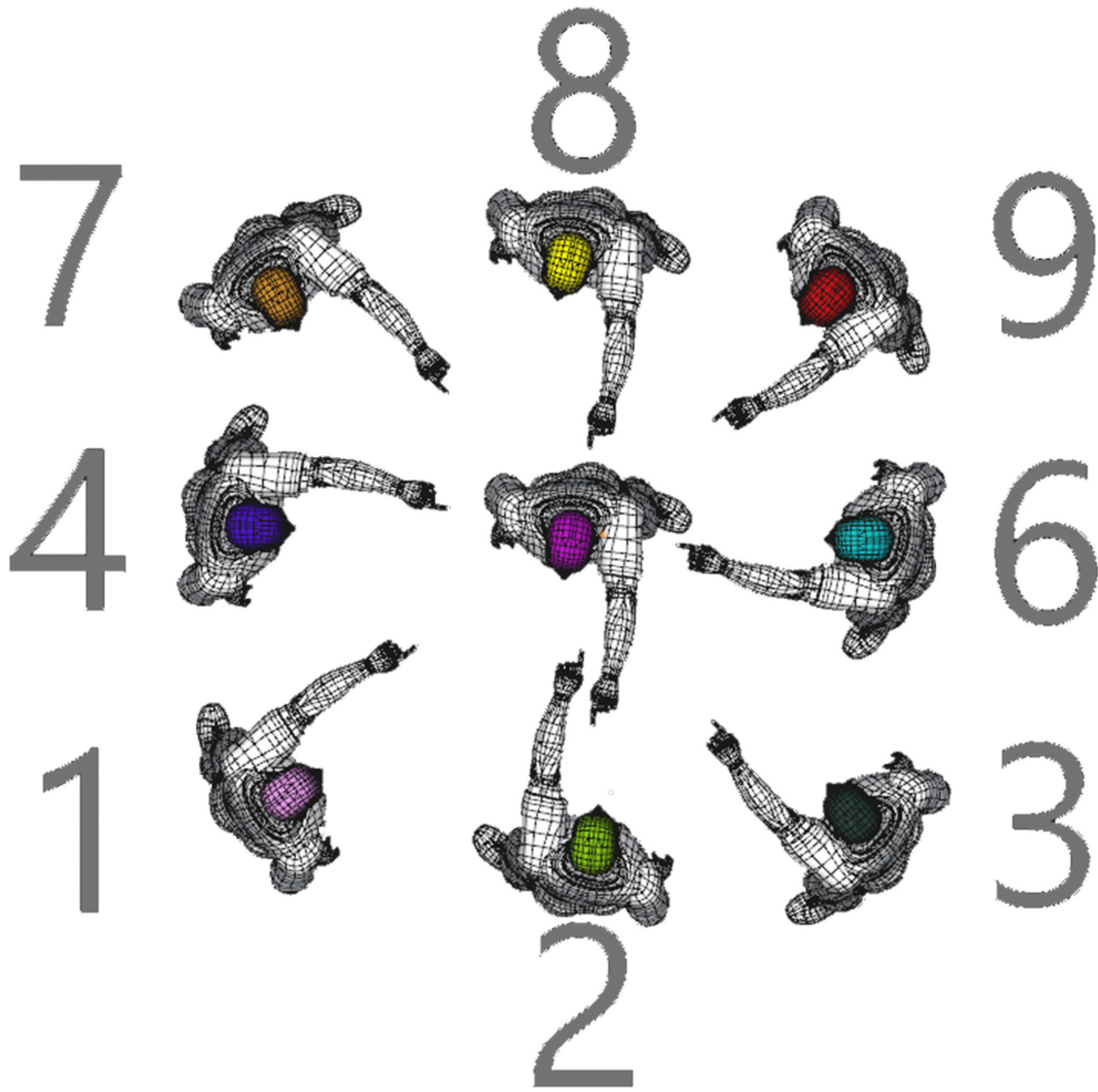
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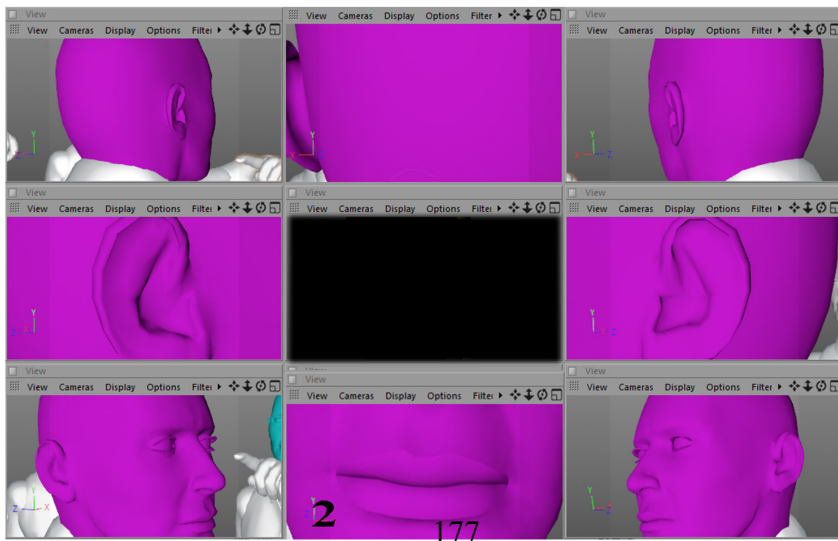


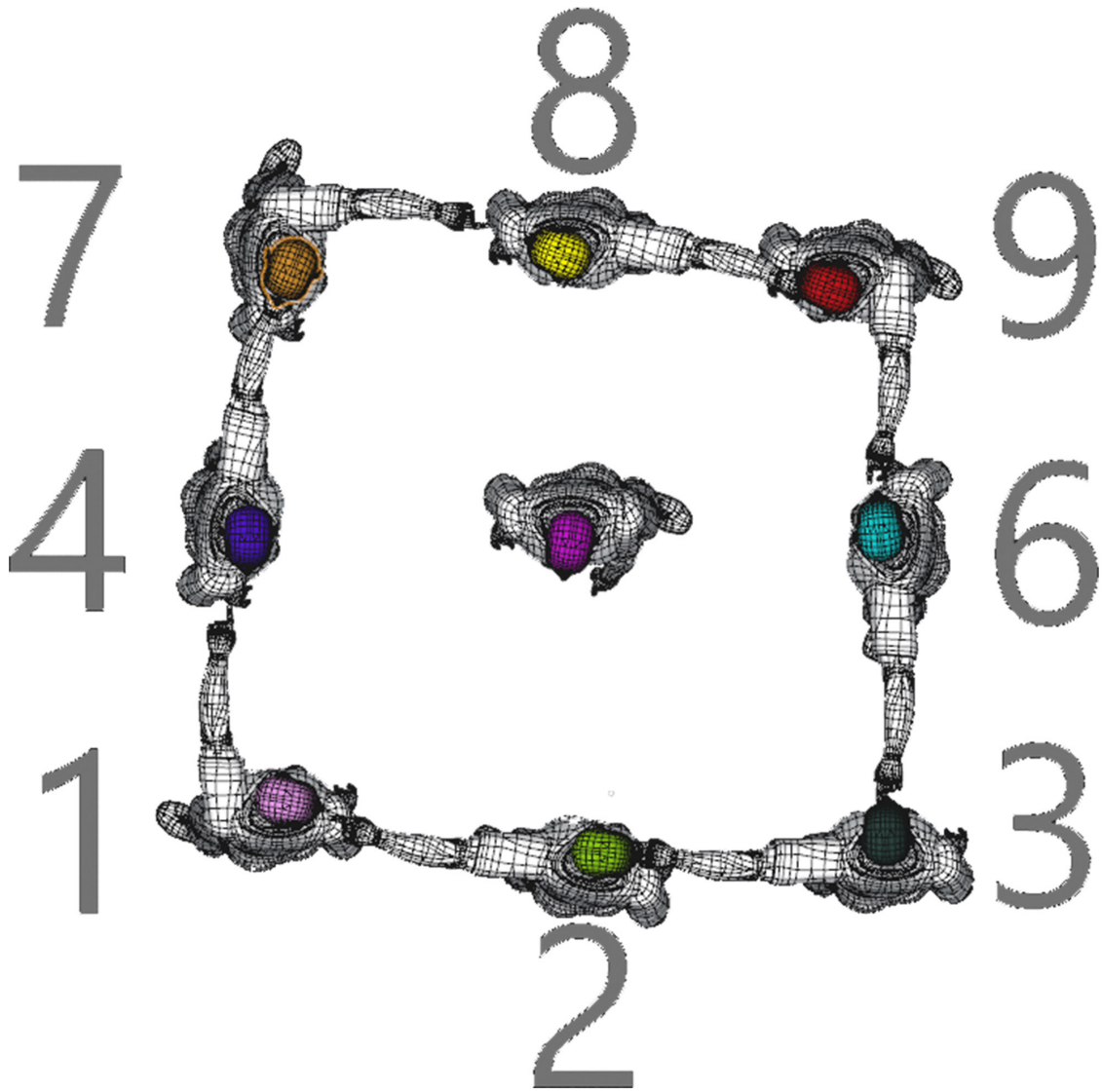
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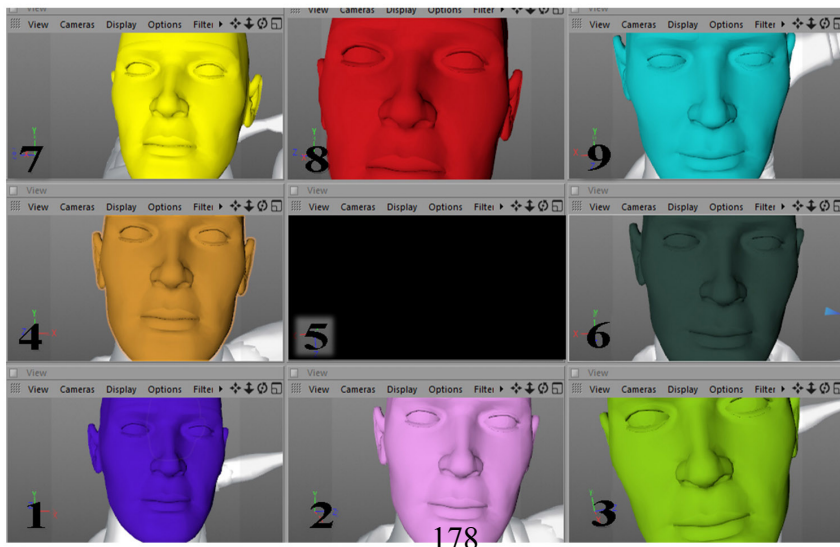


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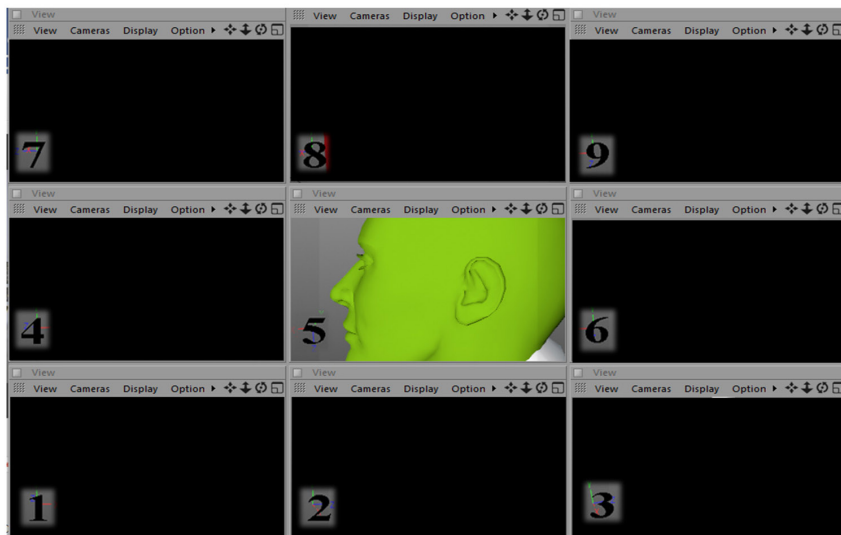


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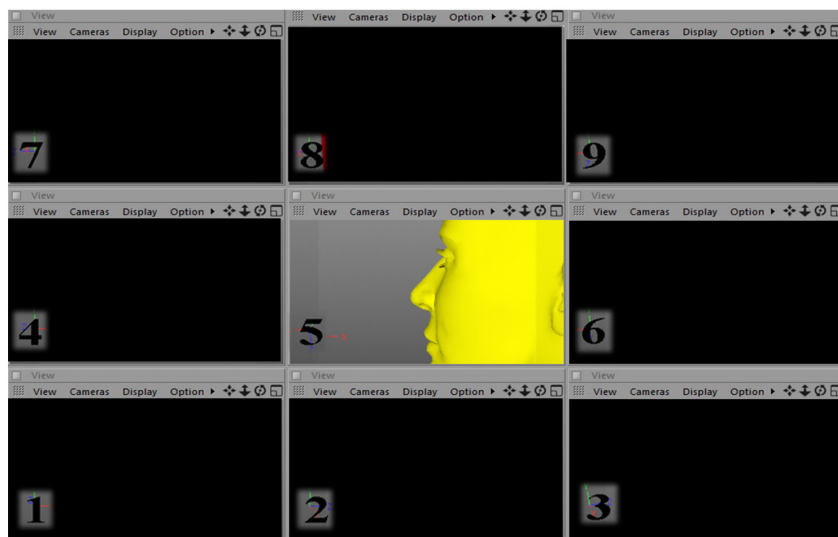


P9a



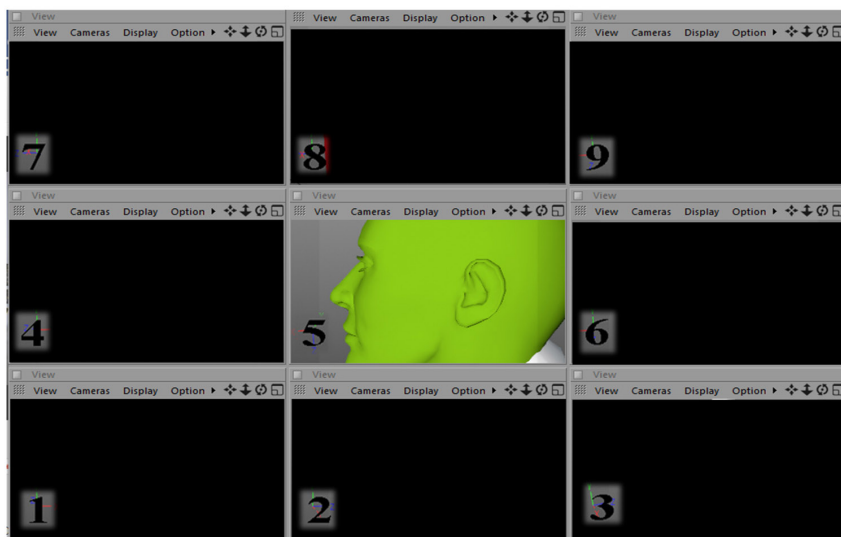


P9b



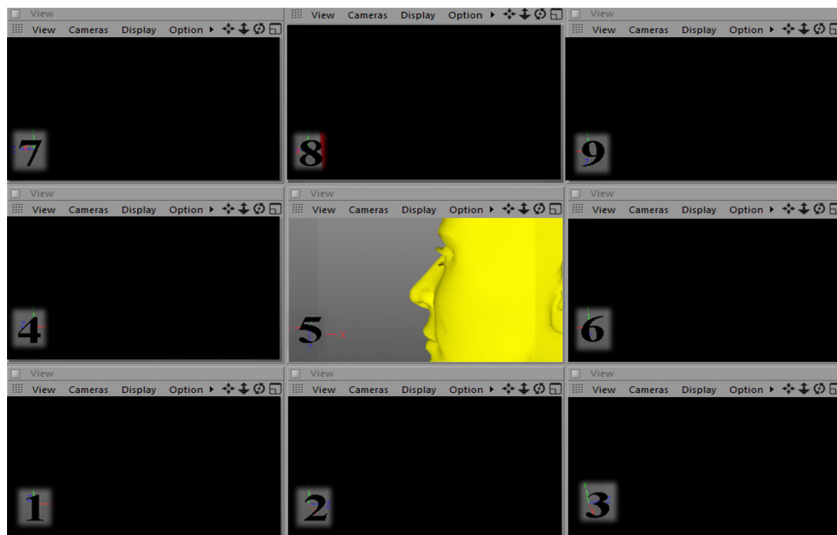


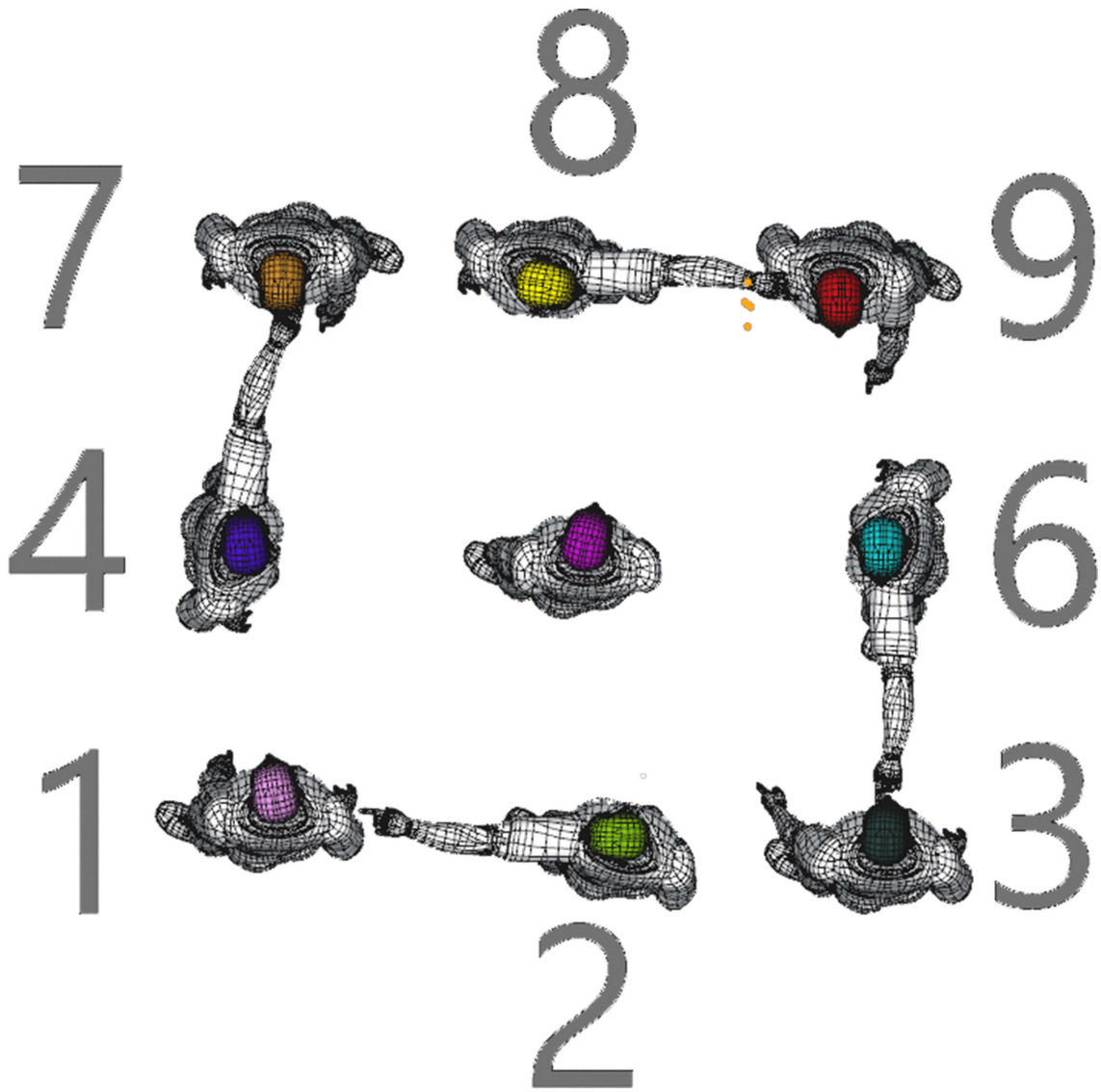
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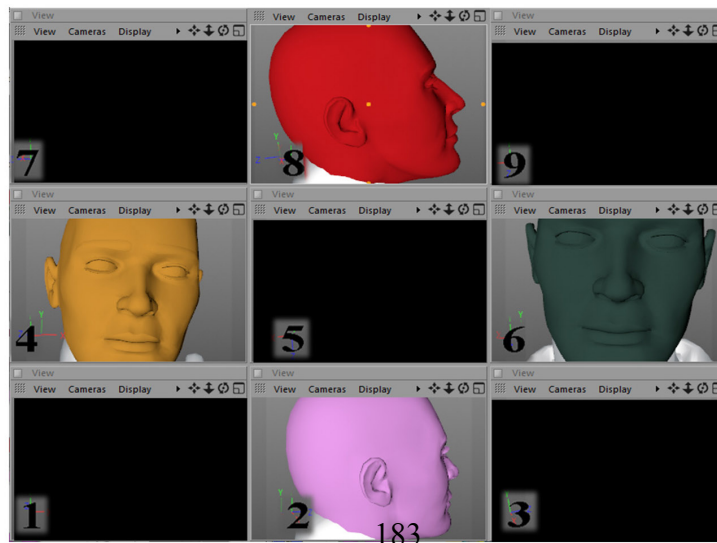


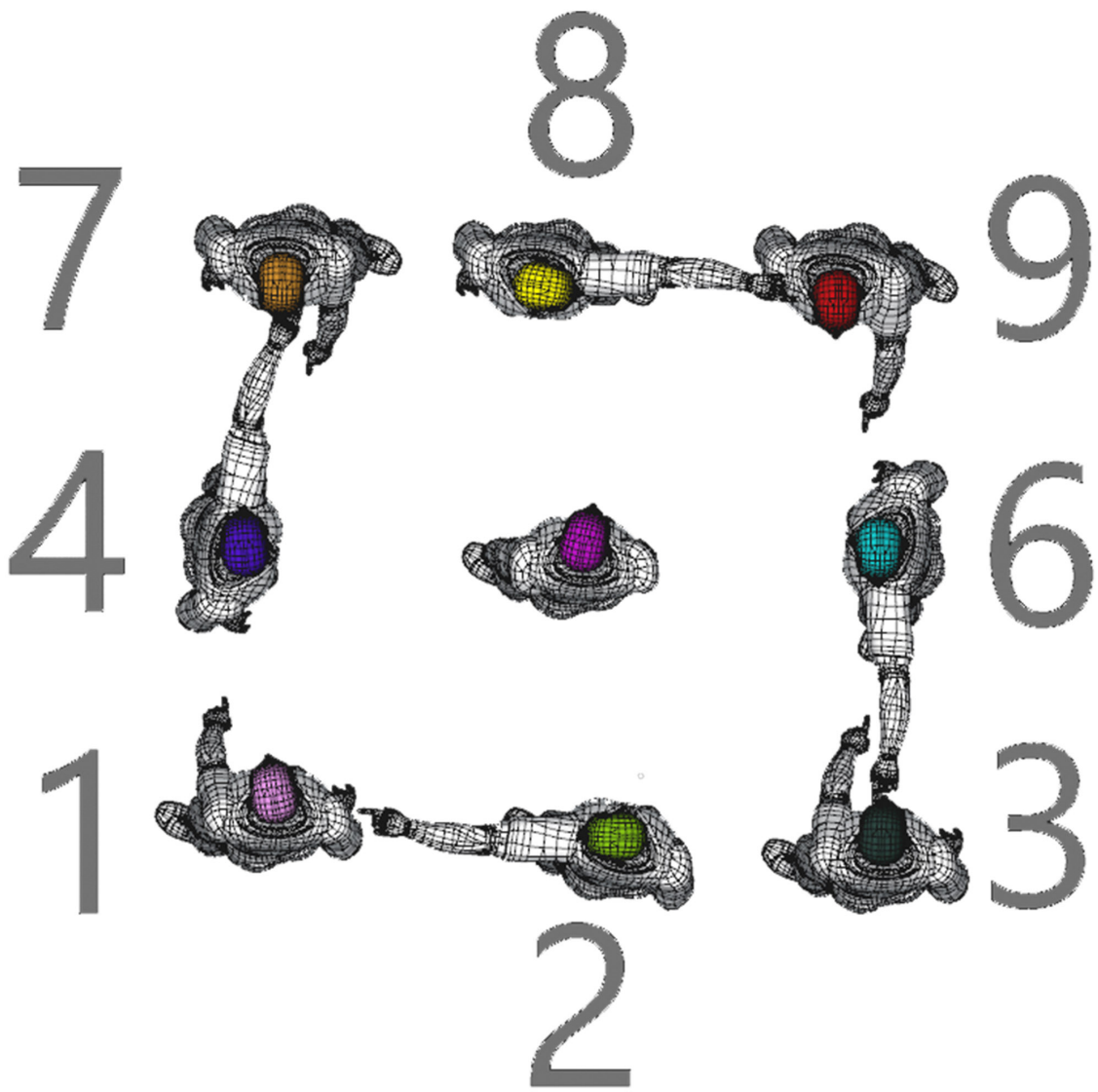
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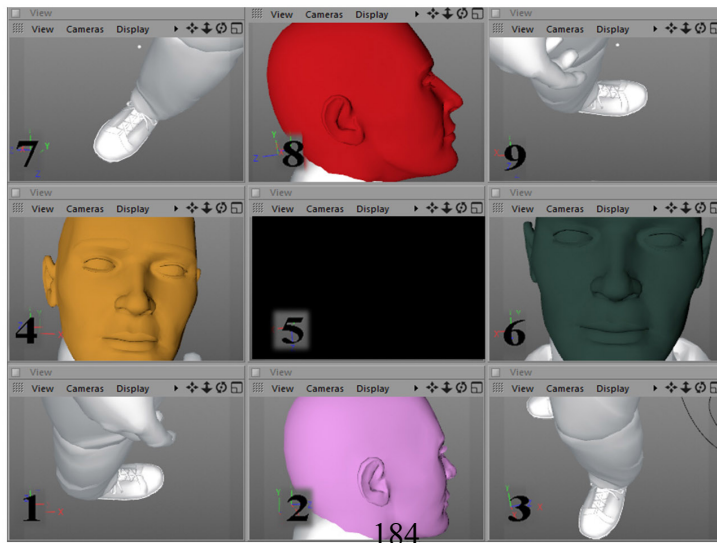


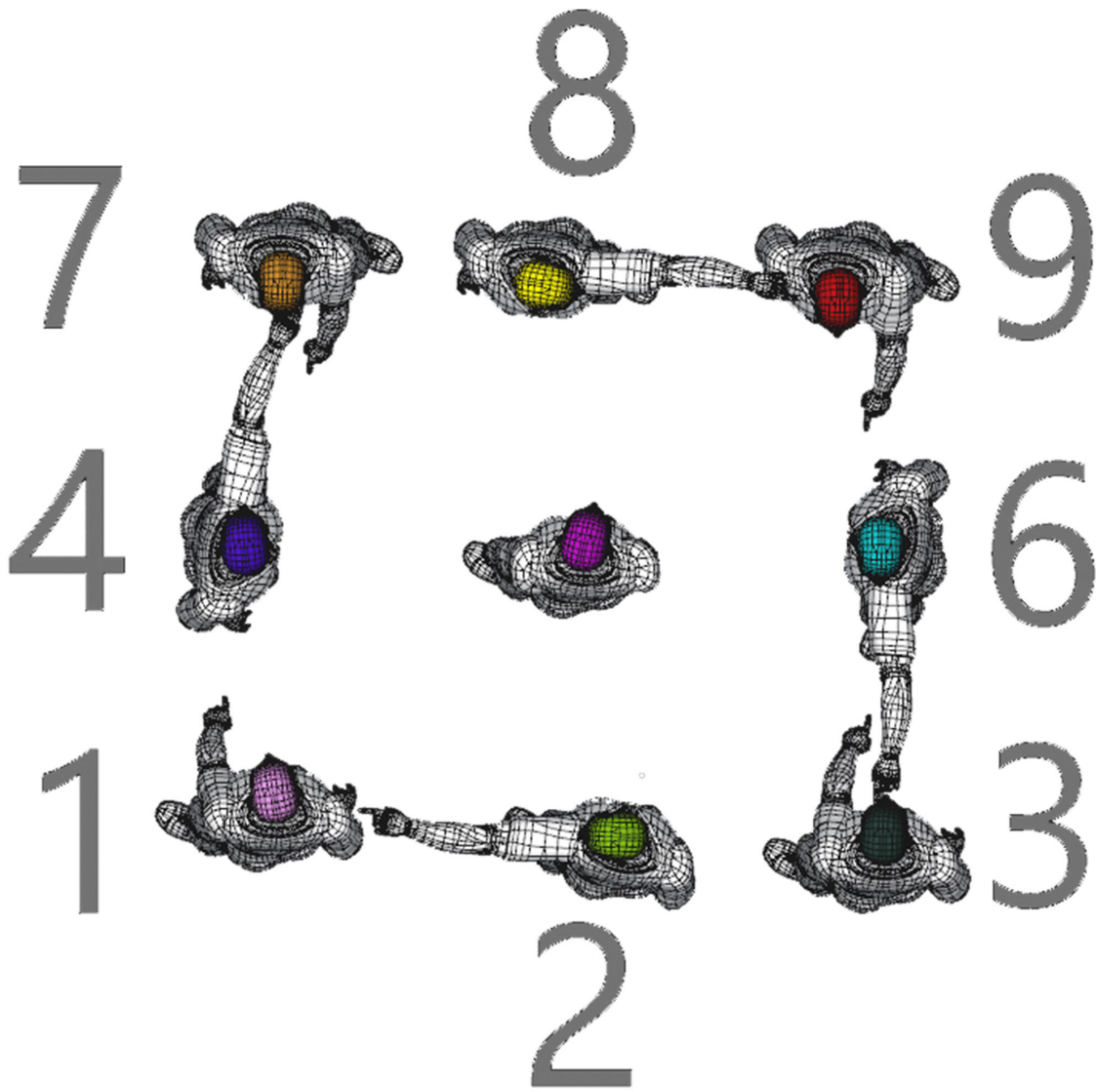
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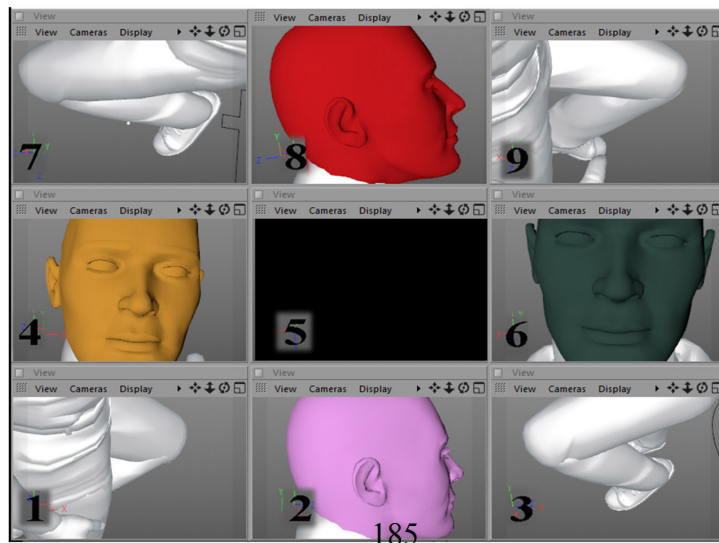


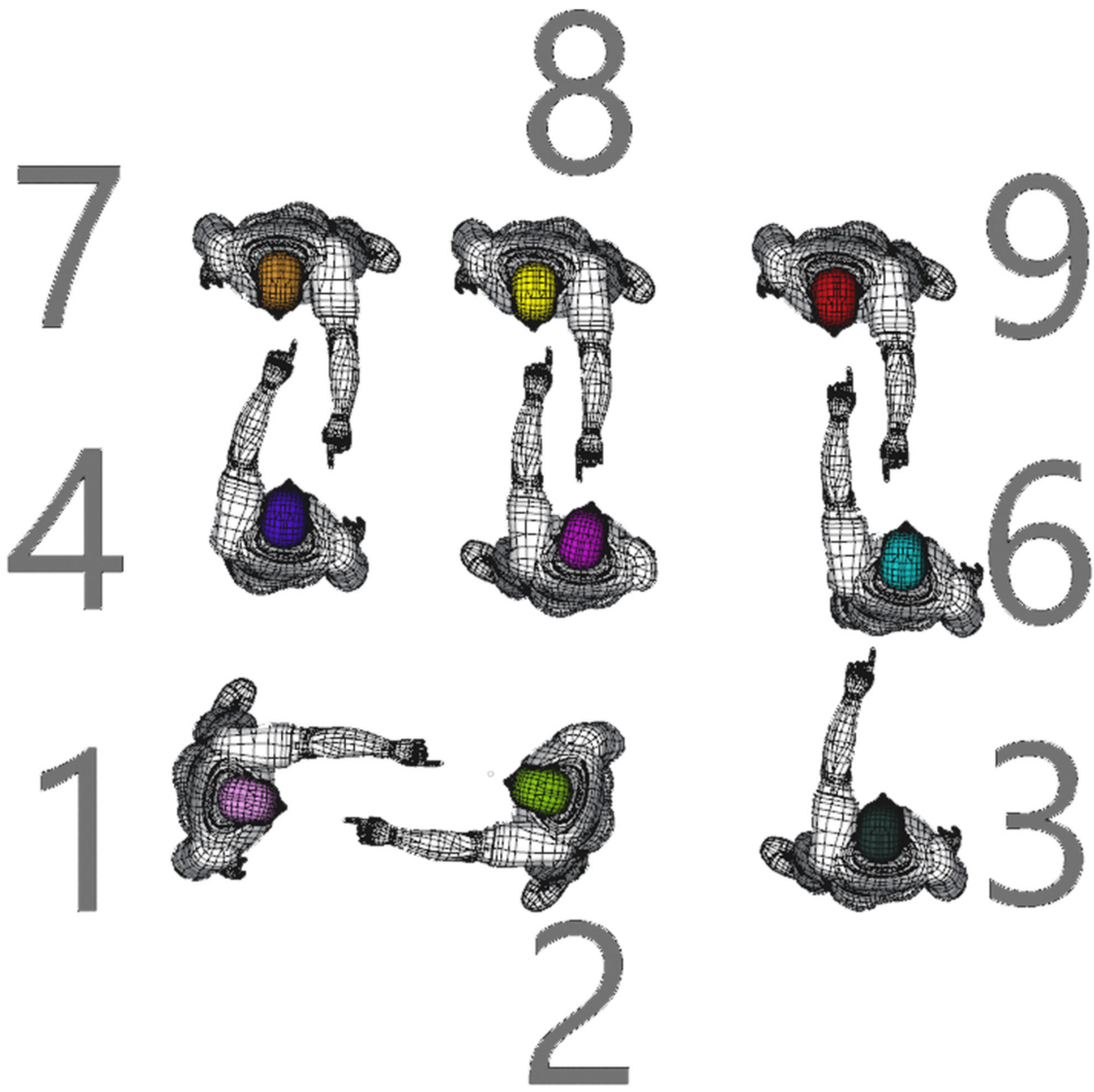
P11a



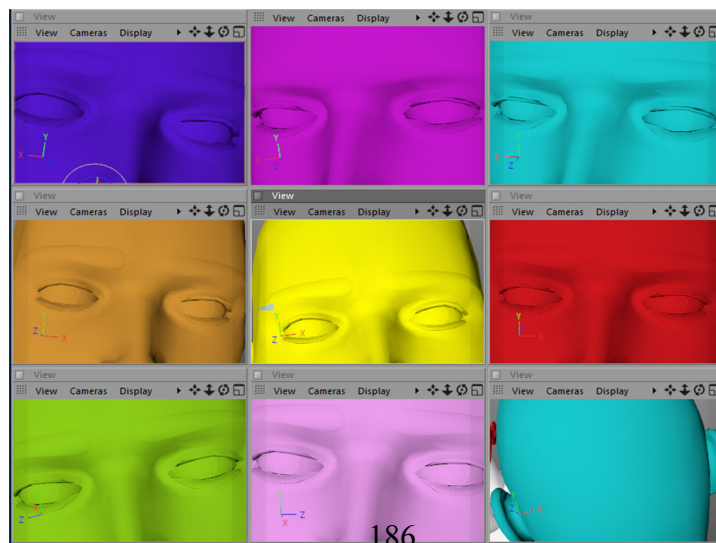


P11b



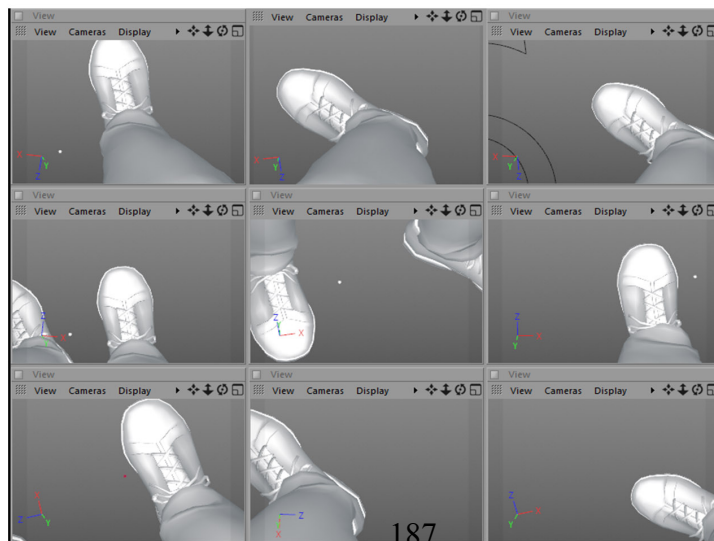


P12



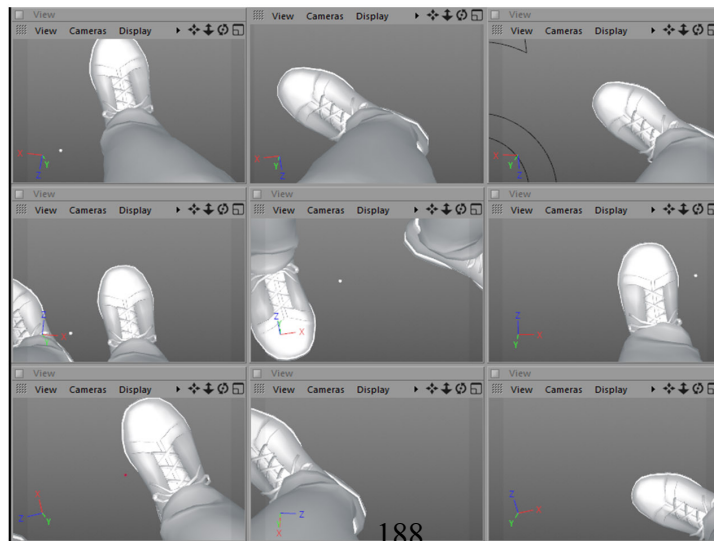


P13





P14



MOVEMENT III

Unit of 6 (around the 360° camera - Panopticon)

III.1 (0:00-1:15): cable gravity pulls (horizontal, vertical, diagonal)

III.2 (1:15-3:00): twitch gravity pulls

III.3 (3:00-4:00): stand still and look into the camera

*Alexa laugh 2:30-3:15**

Unit of 2 (in front of the main screen)

III.1 (0:00-2:00): continue to lay on the floor after Movement II

III.2 (2:00-4:00): stand up, look at the projection, and imitate the live performers as closely as possible

*Alexa laugh 3:00-3:45**

Unit of 2 (on the opposite side of the Unit of 6)

III: (0:00-4:00) revolve in place and super slowly morph between: 1. flute -> ping-pong -> clarinet / 2. tennis -> guitar -> pool

*Alexa laugh at 3:15-4:00**

*Imitate Amazon Alexa's laugh (in the linked video) spasmodically. Vary facial expressions between exaggerated laugh and serious appearance, without synchronizing them to the laughing. https://www.youtube.com/watch?v=p8phGxzUC_Y

MOVEMENT IV

Video

Record a single-shot video of the 10 performers on the same stage where the performance will take place. The performers should be divided in the units specified below and perform the corresponding actions. Move the camera from one unit to the next in the described sequence (red numbers) and frame them without seeing the other performers. A toy robot (with remote) should be controlled by someone to move on the stage around the units. The video should last 6-8 minutes.

Movement IV.1 (4 units): **following instructions**

- 1 – (4) building the chair for the chocolate bowl (use electric screwdrivers)
- 3 – (3) learning to play instruments (flute/clarinet/bass guitar – learning to do the "whistle" from Movement 1)
- 5 – (2) preparing the chairs for performers (hammering, polishing, etc.)
- 7 – (1) making dark chocolate in the bowl

Movement IV.2 (3 units): **practicing elements** from the previous 3 Movements and **following instructions from others** ("trainers" and "students": trainers show how to perform the actions, and tell them what how they can improve)

- 2 – (2=1+1) stretching cables (Movement III)
- 4 – (2=1+1) imitating stick figure from GIF1 (Movement II)
- 6 – (6=1+5) repeating/looping actions (Movement I: ping-pong, military, ballet, sweeping, guitar)

Movement IV.3 (2 units): **technophilia vs. technophobia**

- 8 – (1) controlling the robot arm and raising a small knife
- 9 – (9) hitting the toy robot with ping-pong paddles, tennis racquets, pool cues, brooms until it breaks into pieces

After finishing the sequence, record about 1 minute of sweeping the robot pieces with brooms, while cleaning the stage.

Performance

During Movement IV.1-2, divide in two units (6+4). One unit (6) throws sheets of paper on the floor, while the other unit (4) sweeps them with brooms toward the middle of the stage and arrange the paper to allow the floor projection to be visible.

During Movement IV.1-2 in the video, start preparing for IV.4 gradually (while still arranging the paper). All 10 performers should be in the middle of the stage—prepared with headphones and microphone—when IV.3(1) is on the Main Screen.

Movement IV.4 (1 units divided into 4 lines – 1/2/3/4 – in the same formation as the end of Movement I): **training the neural net** (Beethoven's page 73)

(10) – listen to the voice(s) in the headphones and imitate what you hear as closely as possible. the text is divided into verses (performers hear each other and 10 is amplified) and refrains (all 10 hear the same computer voice and are amplified)

Verse 1

Refrain 1

Verse 2

Refrain 2

Verse 3

Refrain 3

Verse 4

Refrain 4

Verse 5