INWARD: A Computer-Supported Tool for Video-Reflection Improves Efficiency and Effectiveness in Executive Coaching

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Importance of reflection

Various experiences

Review
&
Learn

Reflection

Reflection is an essential process of learning. Through reflection, one can learn from their experiences. In other words, it is essential to review the experiences from a different perspective.

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Record their words and behaviors

Watch and reflect by themselves

One way to provide such a perspective is video-reflection. By watching videos recording words and behaviors of themselves, they can review the experiences. For example, video-reflection is often employed by teachers to improve their skills by watching videos of their teaching.

Coach

Coachee

1-on-1 sessions of **executive coaching**

Another area where video-reflection is commonly used is professional development, particularly executive coaching. In executive coaching, coaches guide coachees to reflectively think about their experiences or behaviors through one-on-one sessions to help coachees achieve their goals.
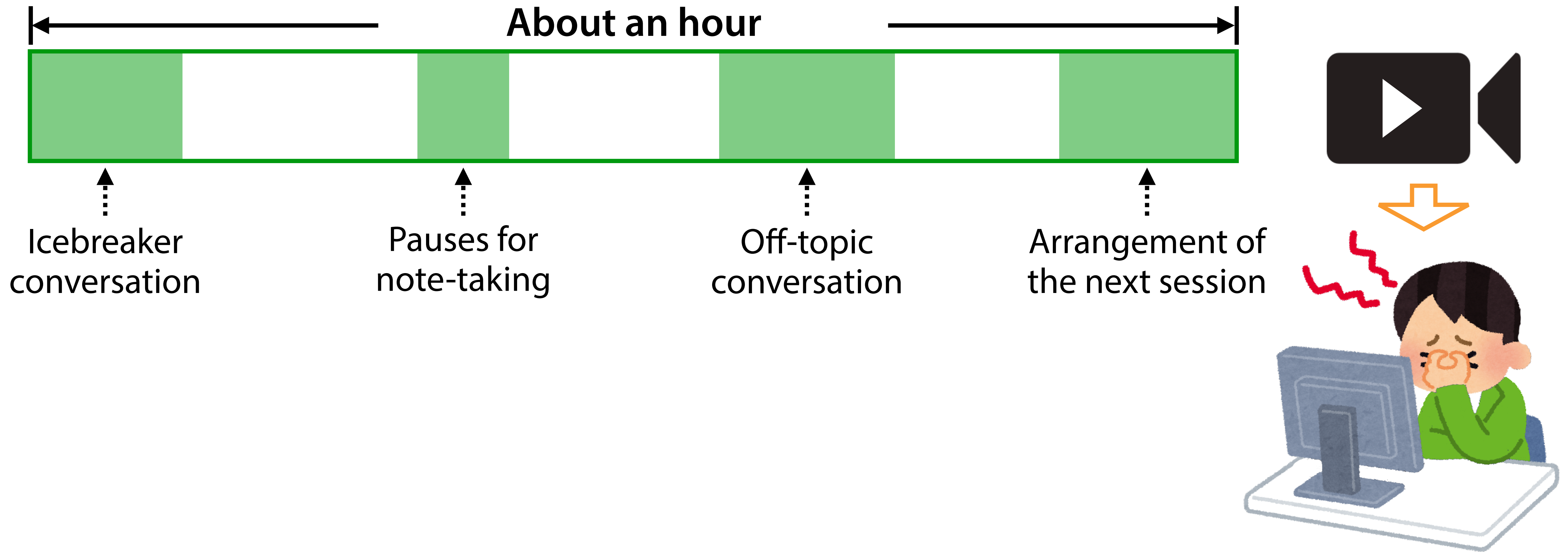
Video-reflection is also used in …

1-on-1 sessions of executive coaching

Reflect from **a neutral perspective**

Then, some coaches ask coachees to watch recordings of the sessions so that they can further reflect on themselves from a neutral perspective. Given that the importance of reflection in executive coaching is often emphasized, video-reflection is becoming a popular technique.
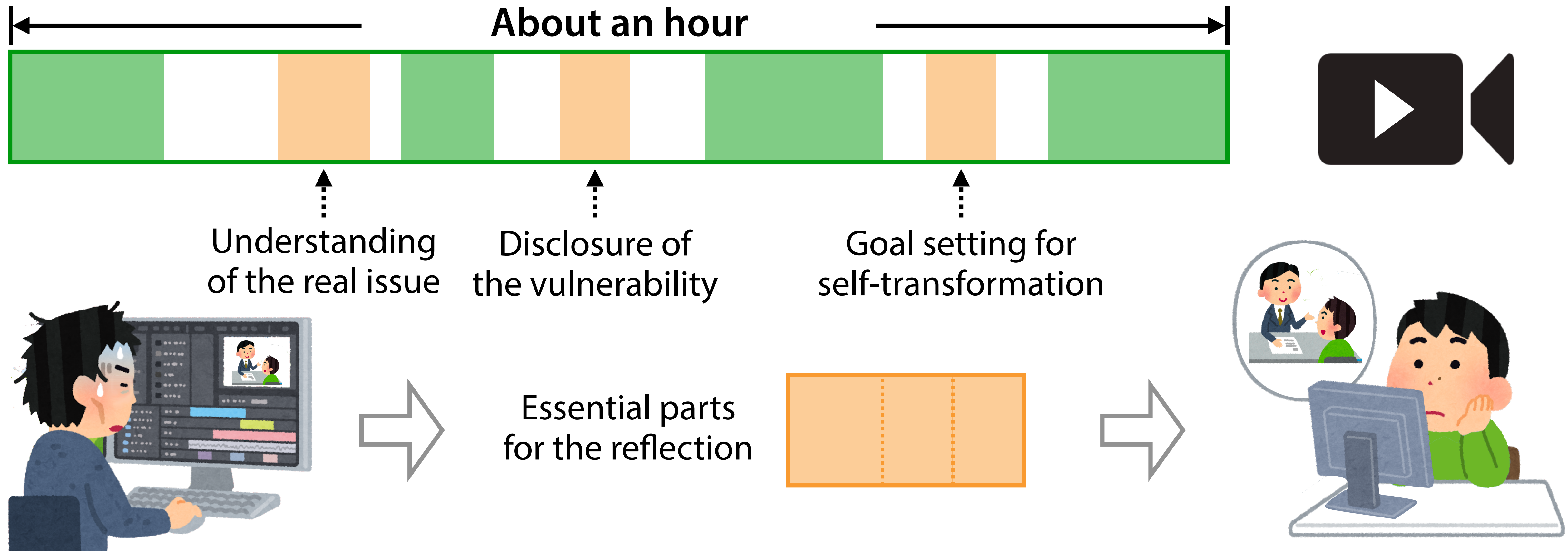
A barrier to the adoption of video-reflection

About an hour

Icebreaker conversation

Pauses for note-taking

Off-topic conversation

Arrangement of the next session

However, there is one barrier to adopting video-reflection, that is, the time necessary to watch a video that can last around an hour. Considering that the session contains an icebreaker conversation or pauses for note-taking, the coachee would not need to watch the entire video.

A barrier to the adoption of video-reflection

About an hour

Understanding
of the real issue

Disclosure of
the vulnerability

Goal setting for
self-transformation

Essential parts
for the reflection

On the other hand, manually preparing a summarized version that extracts the essential parts of the session requires significant time and is challenging for the coach. We anticipate that this gap conversely suggests how computers can support reflection in executive coaching.
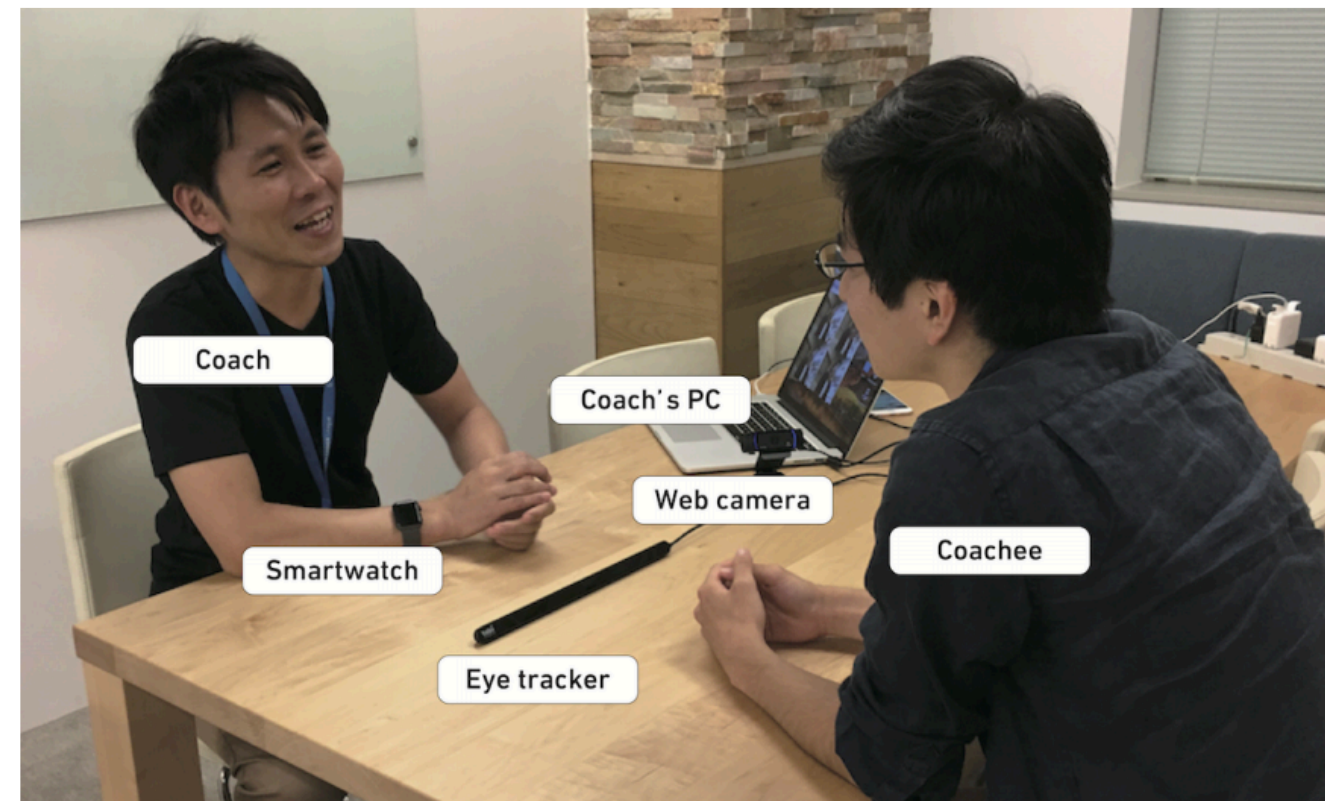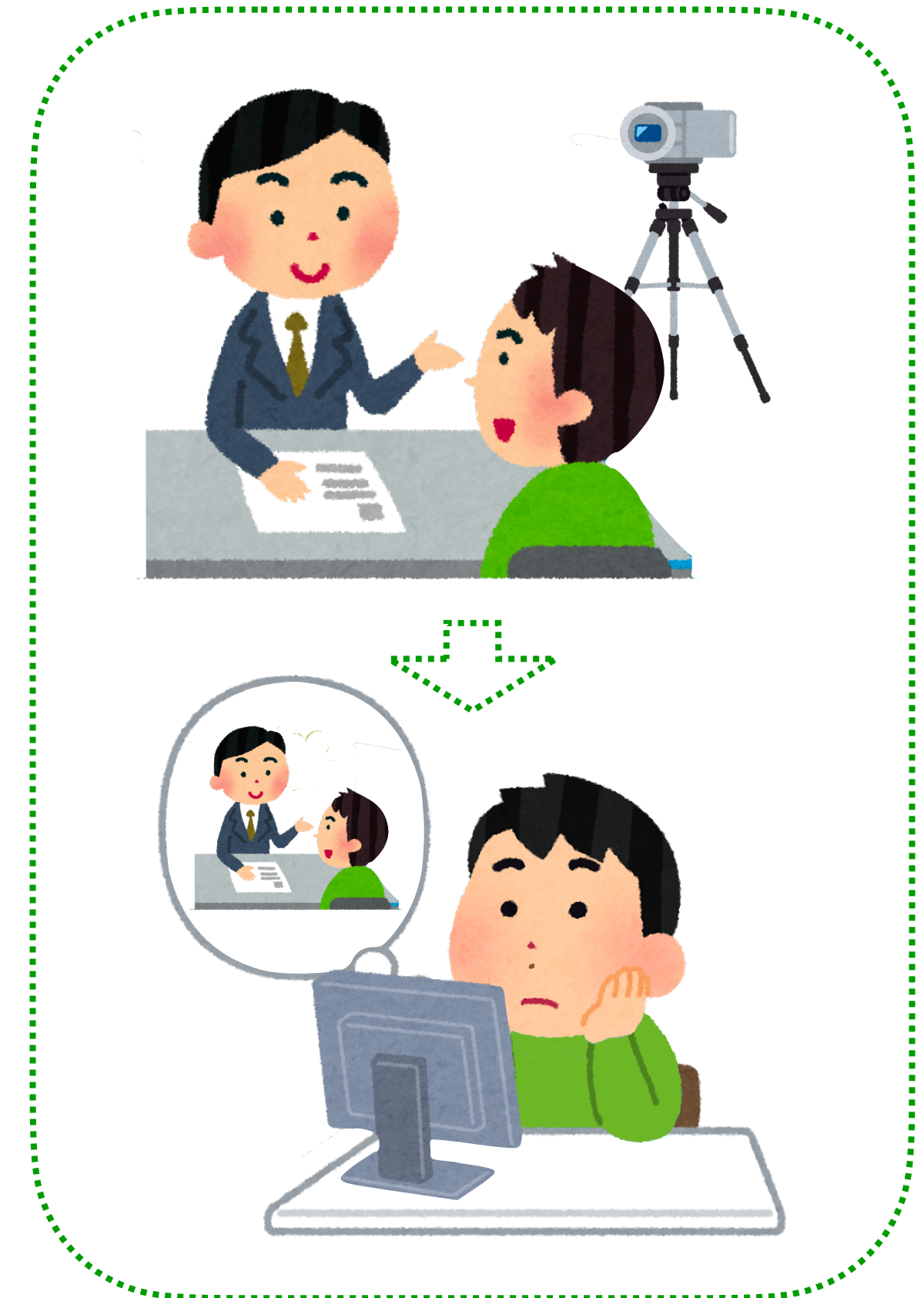
Recent advances in understanding humans

Human behavior extraction [63]

OpenPose
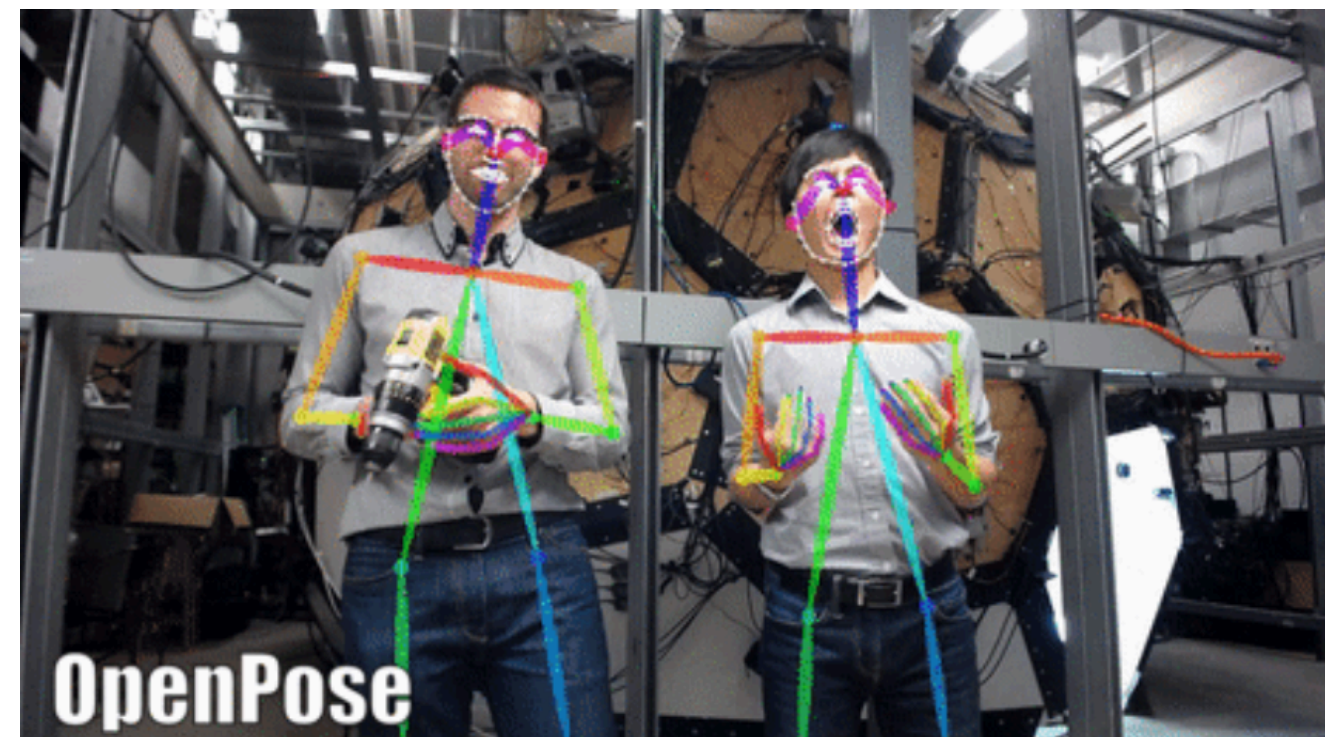
Conversation analysis for coaching [2]

Coach
Coach's PC
Web camera
Smartwatch
Coachee
Eye tracker

**Can computers improve the reflection process?**

[63] Shih-En Wei, et al. 2016. Convolutional Pose Machines. In Proceedings of the 29th IEEE Conference on Computer Vision and Pattern Recognition. IEEE Computer Society.
[2] Riku Arakawa and Hiromu Yakura. 2019. REsCUE: A framework for REal-time feedback on behavioral CUEs using multimodal anomaly detection. In Proceedings of the 2019 ACM CHI. ACM.

In particular, many methods to analyze human conversation by leveraging computer vision technologies have been proposed. By providing a tool that combines these methods for video-reflection, we expect an improvement in the efficiency of the reflection process.

Computers for a neutral discussion ground

Computers would introduce
**a neutral perspective
as a third party**.
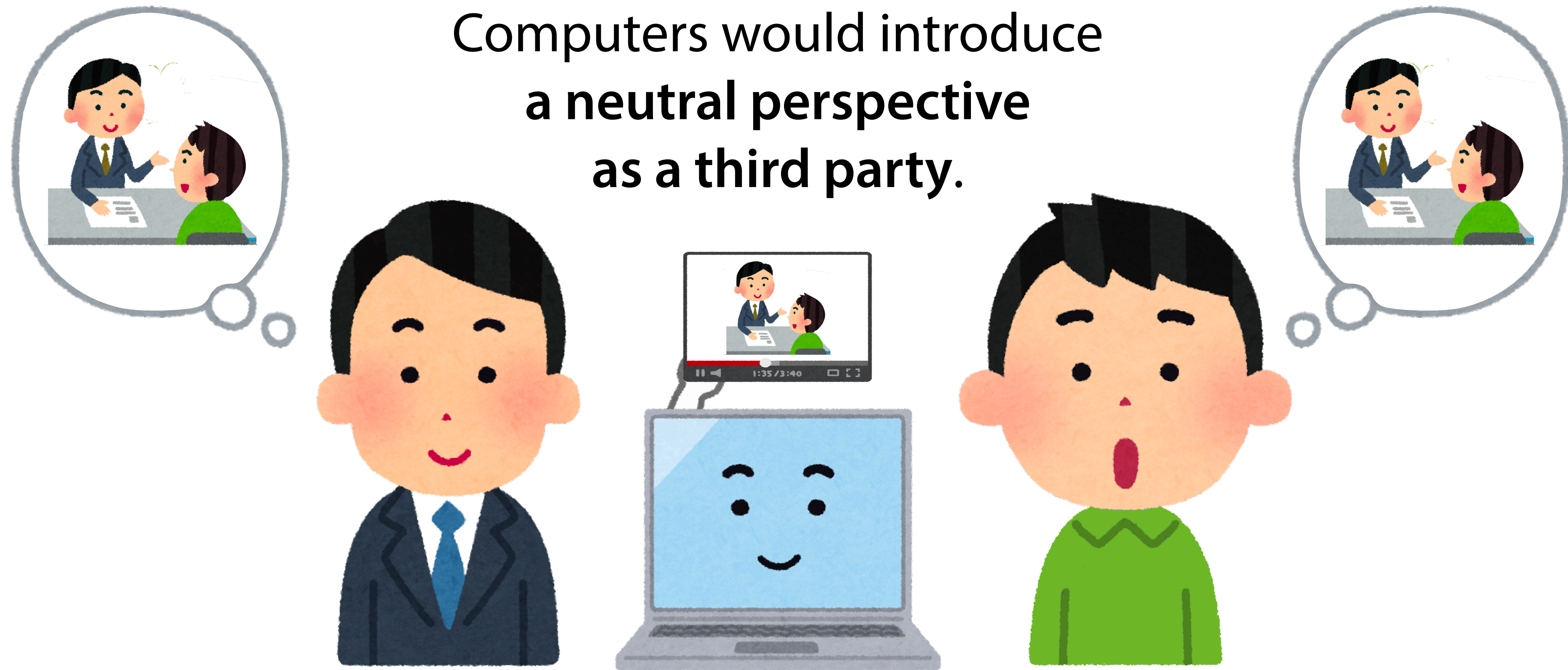
Moreover, we also focused on the capability of computers for providing a neutral perspective. In detail, by involving computers for reflection as a third party, we would be able to offer a ground for discussion that is independent of both the coach's and the coachee's perspective.

Computers for a neutral discussion ground

It gives an opportunity
to have **meta-reflection.**
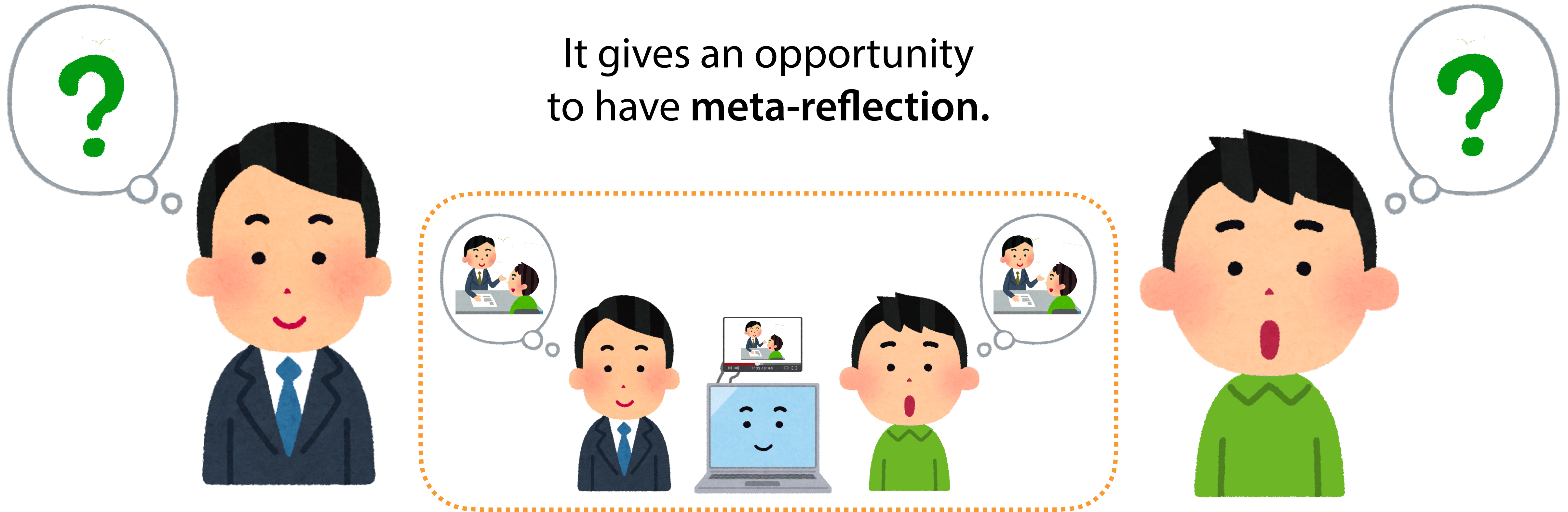
In particular, meta-reflection, where the participants reflect on not only the content but also their thinking about the session, is known to lead to a further outcome. Thus, providing such a discussion using computers would improve the effectiveness of reflection.

H1: The computational support in video-reflection leads to
a time-efficient and effective reflection of coaching sessions.

H2: The computational support in meta-reflection leads to
a further outcome of the reflection.

From these points, to investigate how computers can support video-reflection, we conducted a study with professional coaches on these two hypotheses.
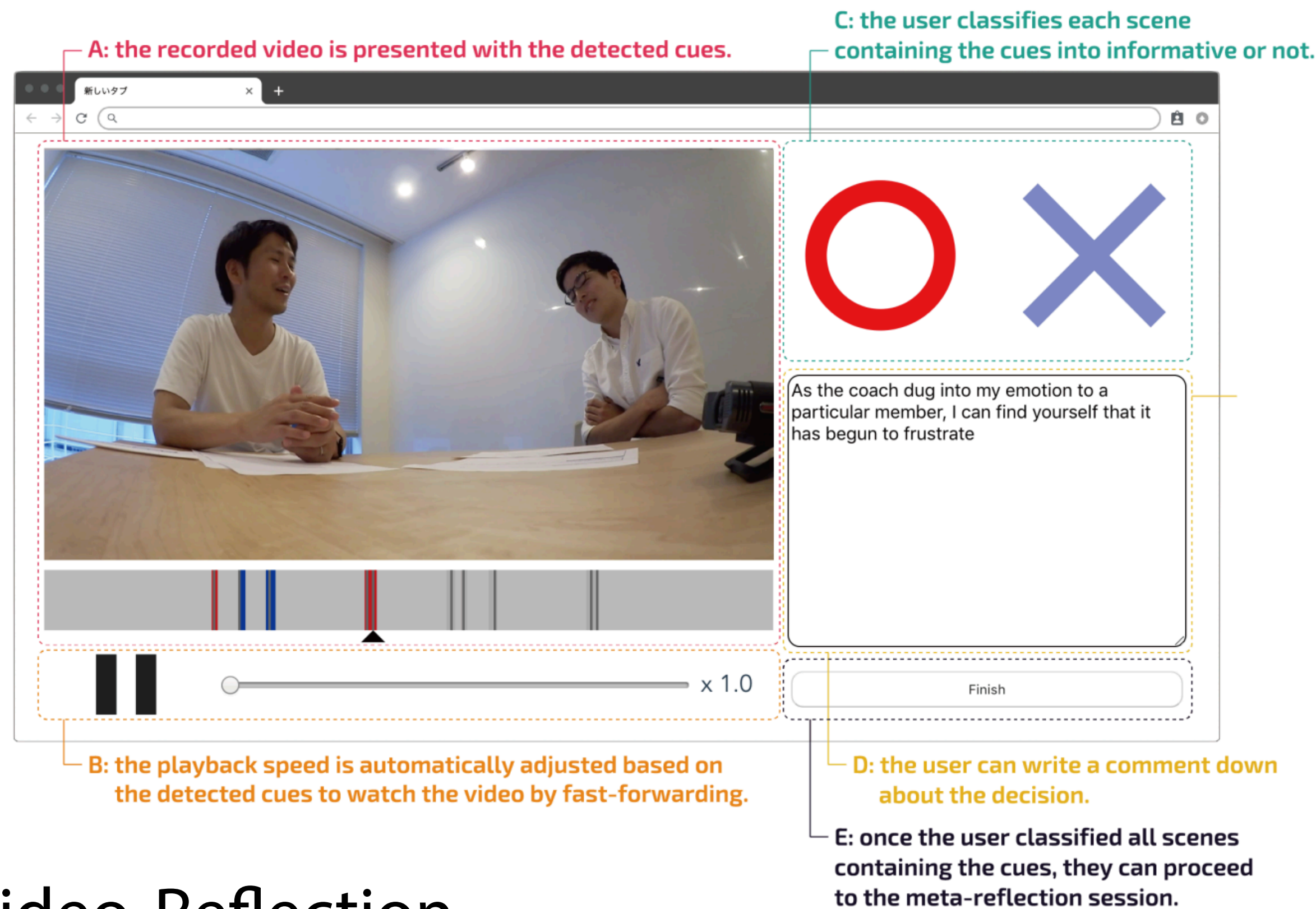
H1: The computational support in video-reflection leads to a time-efficient and effective reflection of coaching sessions.

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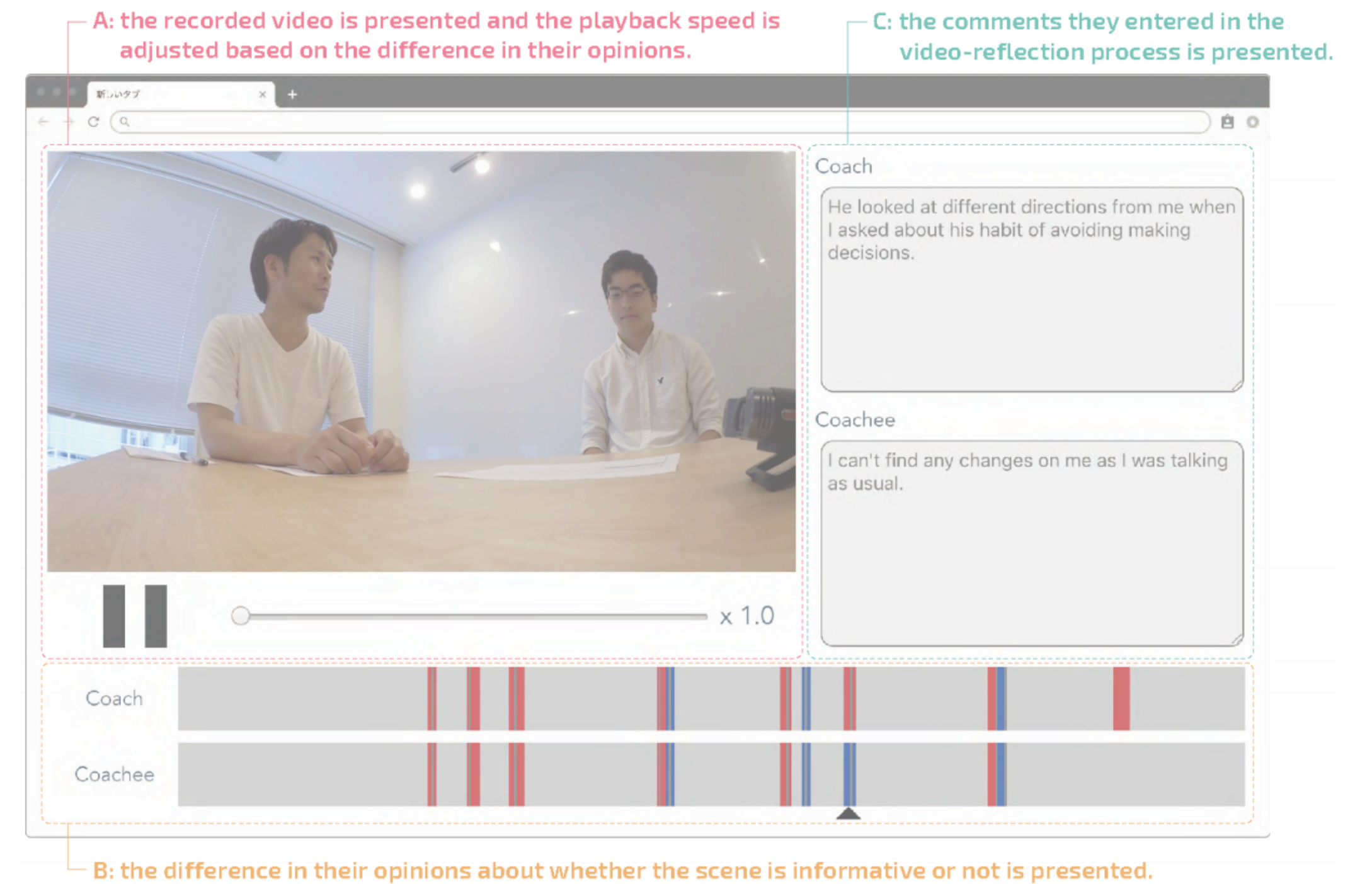
INWARD: a computer-supported tool for video-reflection

If these hypotheses are supported, then it can pave the way for improving executive coaching through computer support. Thus, we evaluated them by implementing INWARD, a tool designed explicitly for video-reflection.
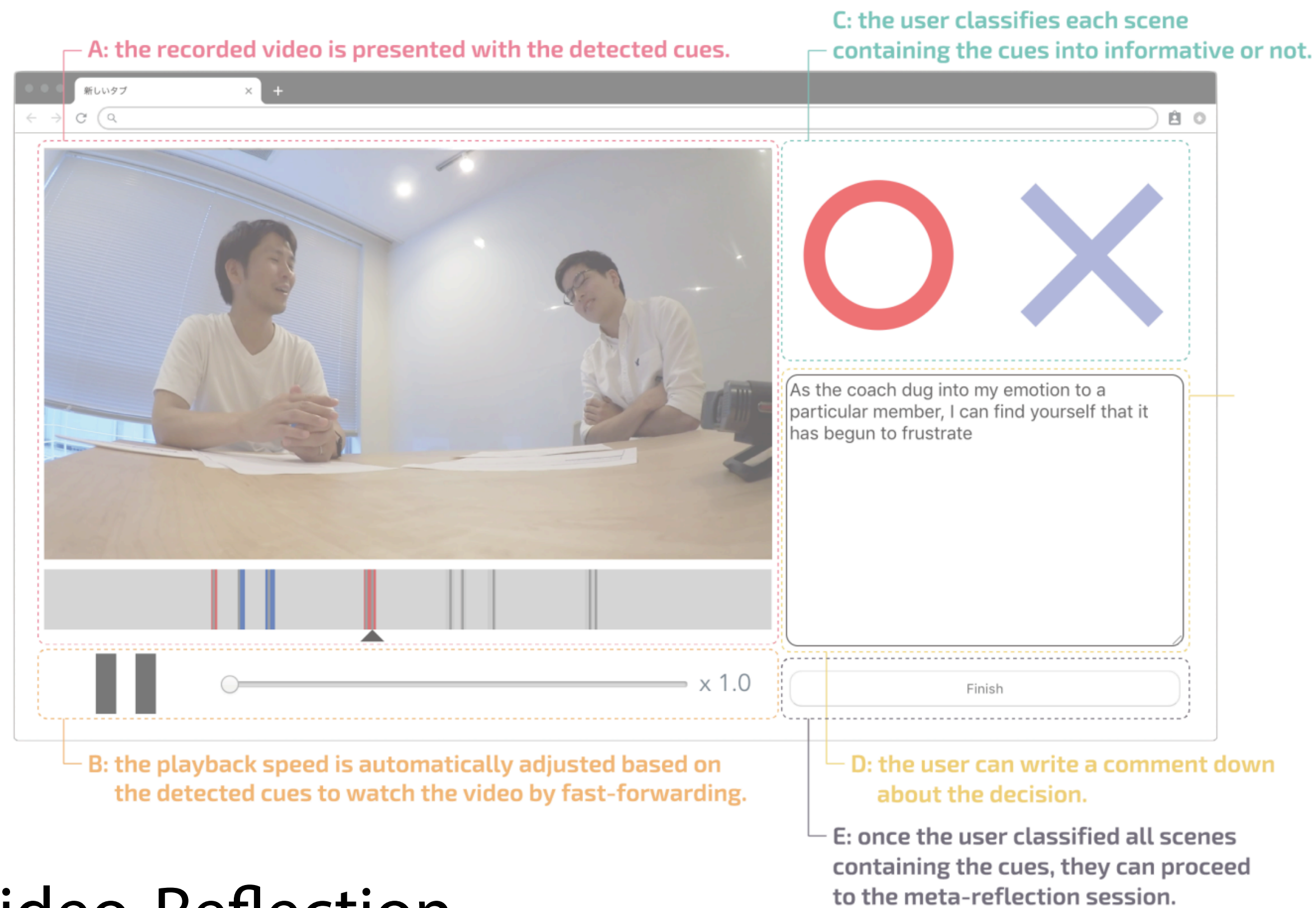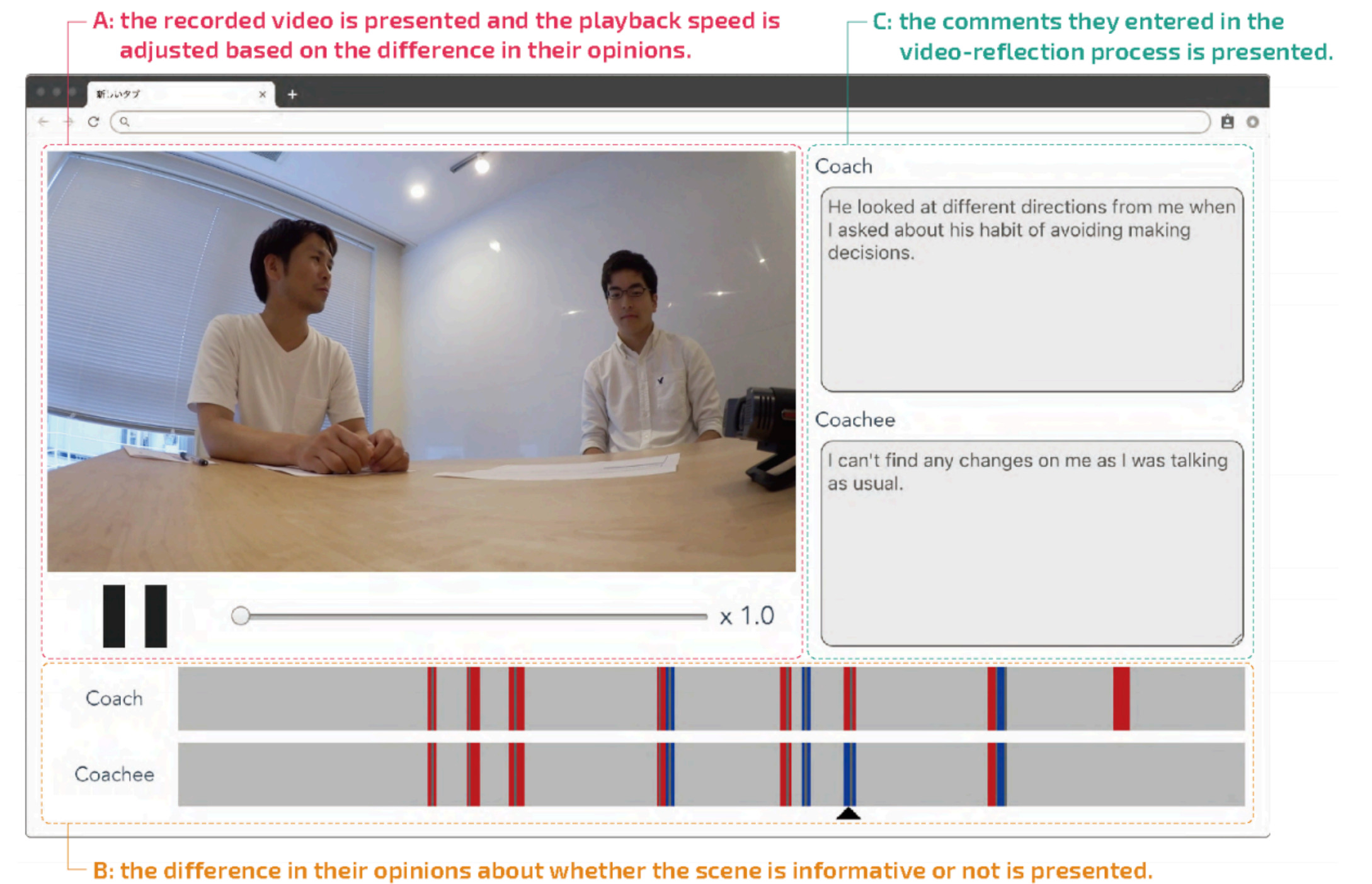
INWARD

A: the recorded video is presented with the detected cues.

C: the user classifies each scene containing the cues into informative or not.

As the coach dug into my emotion to a particular member, I can find yourself that it has begun to frustrate

B: the playback speed is automatically adjusted based on the detected cues to watch the video by fast-forwarding.

D: the user can write a comment down about the decision.

E: once the user classified all scenes containing the cues, they can proceed to the meta-reflection session.

A: the recorded video is presented and the playback speed is adjusted based on the difference in their opinions.

C: the comments they entered in the video-reflection process is presented.

Coach
He looked at different directions from me when I asked about his habit of avoiding making decisions.

Coachee
I can't find any changes on me as I was talking as usual.

B: the difference in their opinions about whether the scene is informative or not is presented.

Video-Reflection

Meta-Reflection

INWARD supports the reflection in two steps. Subsequently to the coaching session, it provides a video-reflection process for both the coach and coachee separately. It suggests important scenes that are automatically extracted using their behavior analysis.
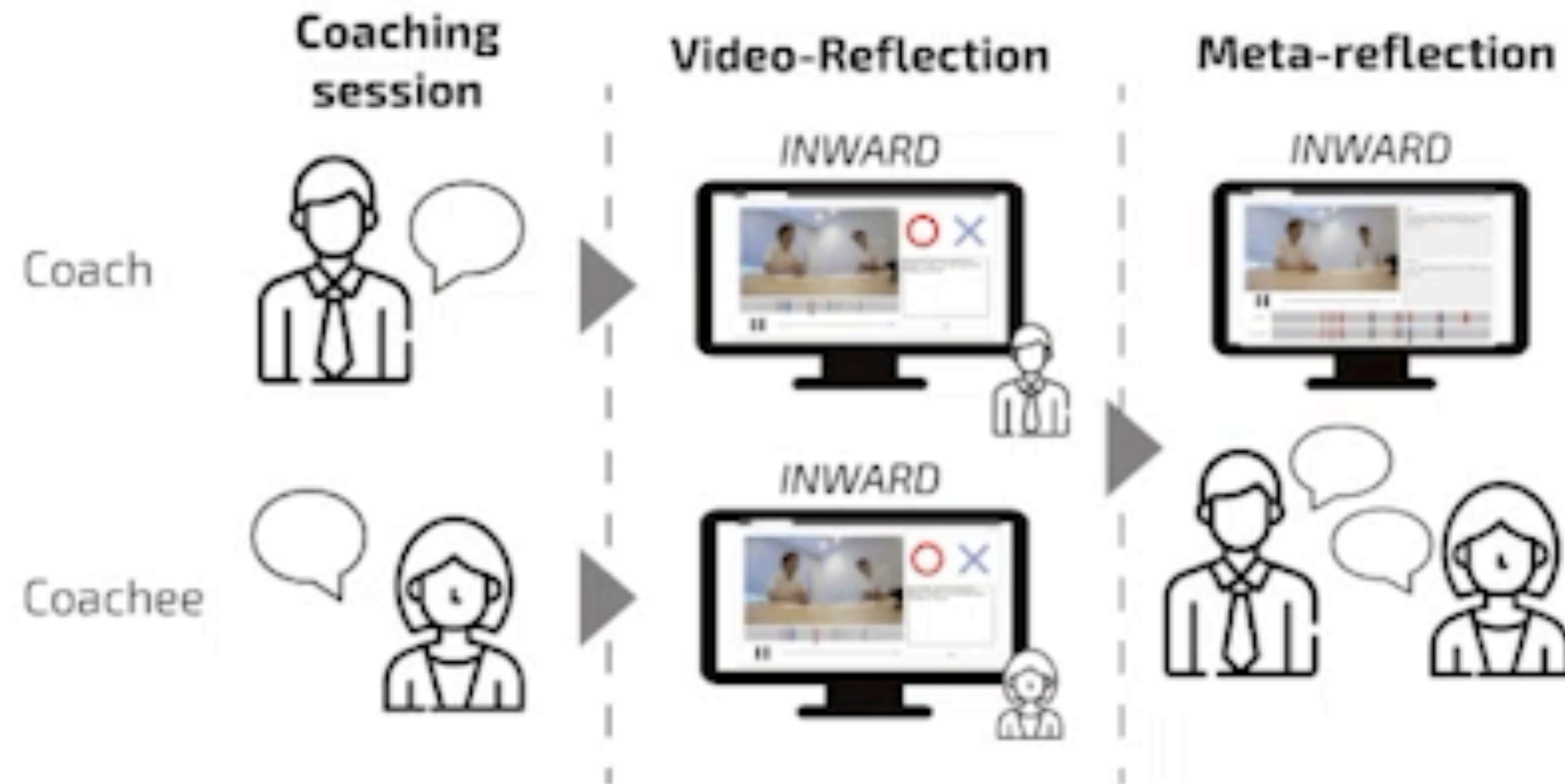
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D: the user can write a comment down about the decision.

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B: the difference in their opinions about whether the scene is informative or not is presented.

Video-Reflection   Meta-Reflection

Then, it provides the computer-facilitated meta-reflection process by evoking a discussion on the result of the video-reflection process between them. Now we would like to present the usage of INWARD.

INWARD

A Computer-Supported Tool for Video-Reflection Improves Efficiency and Effectiveness in Executive Coaching

In this video, we introduce the usage of INWARD.

INWARD

A: the recorded video is presented with the detected cues.

C: the user classifies each scene containing the cues into informative or not.

As the coach dug into my emotion to a particular member, I can find yourself that it has begun to frustrate

x 1.0

Finish

B: the playback speed is automatically adjusted based on the detected cues to watch the video by fast-forwarding.

D: the user can write a comment down about the decision.

E: once the user classified all scenes containing the cues, they can proceed to the meta-reflection session.

Video-Reflection

Unsupervised anomaly detection for important cues extraction (CHI2019)

If you are interested in how to detect the important scenes, please refer to our previous paper!

Professional coaches

Client coachees

To investigate our hypotheses, we conducted a user study with professional coaches and their coachees using INWARD. We first recruited five volunteer coaches and their 20 client coachees, and then randomly divided them into two groups of treatment and control.

Measurement of Reflection *Efficiency*

Measurement of Reflection *Effectiveness*

12 item
7-point Likert scale
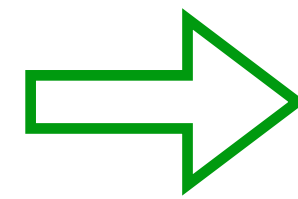
Time

Authenticity Scale
defined by Wood et al. [66]

[66] Wood, Alex M., et al. "The authentic personality: A theoretical and empirical conceptualization and the development of the Authenticity Scale." *Journal of Counseling Psychology* 55.3 (2008): 385.

We introduce two measures: time and authenticity. The time metric indicates how efficient INWARD makes the reflection process. Authenticity is measured by a questionnaire, Authenticity Scale, to evaluate the efficacy of the reflection process.
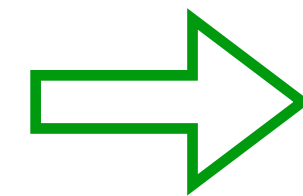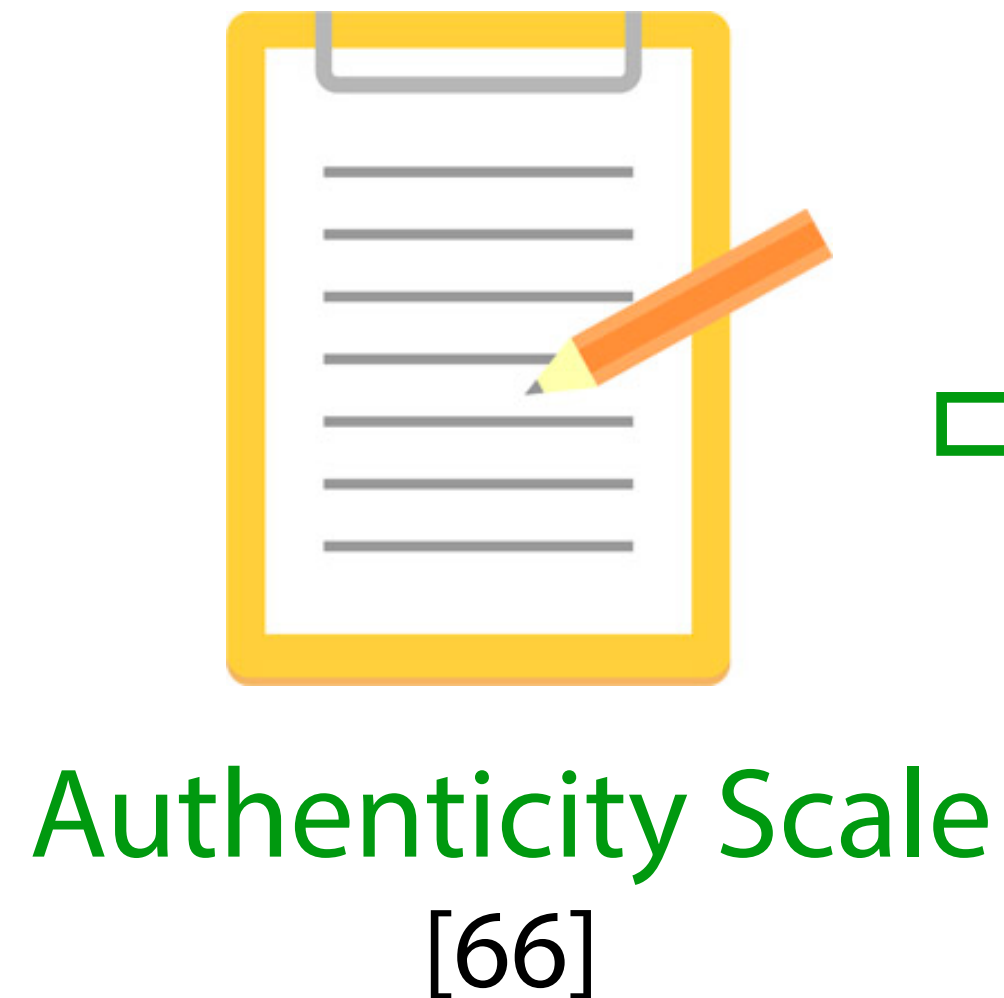
(1) Self-alienation   (2) Authentic living   (3) Accepting external influence

Authenticity Scale
[66]

[66] Wood, Alex M., et al. "The authentic personality: A theoretical and empirical conceptualization and the development of the Authenticity Scale." *Journal of Counseling Psychology* 55.3 (2008): 385.
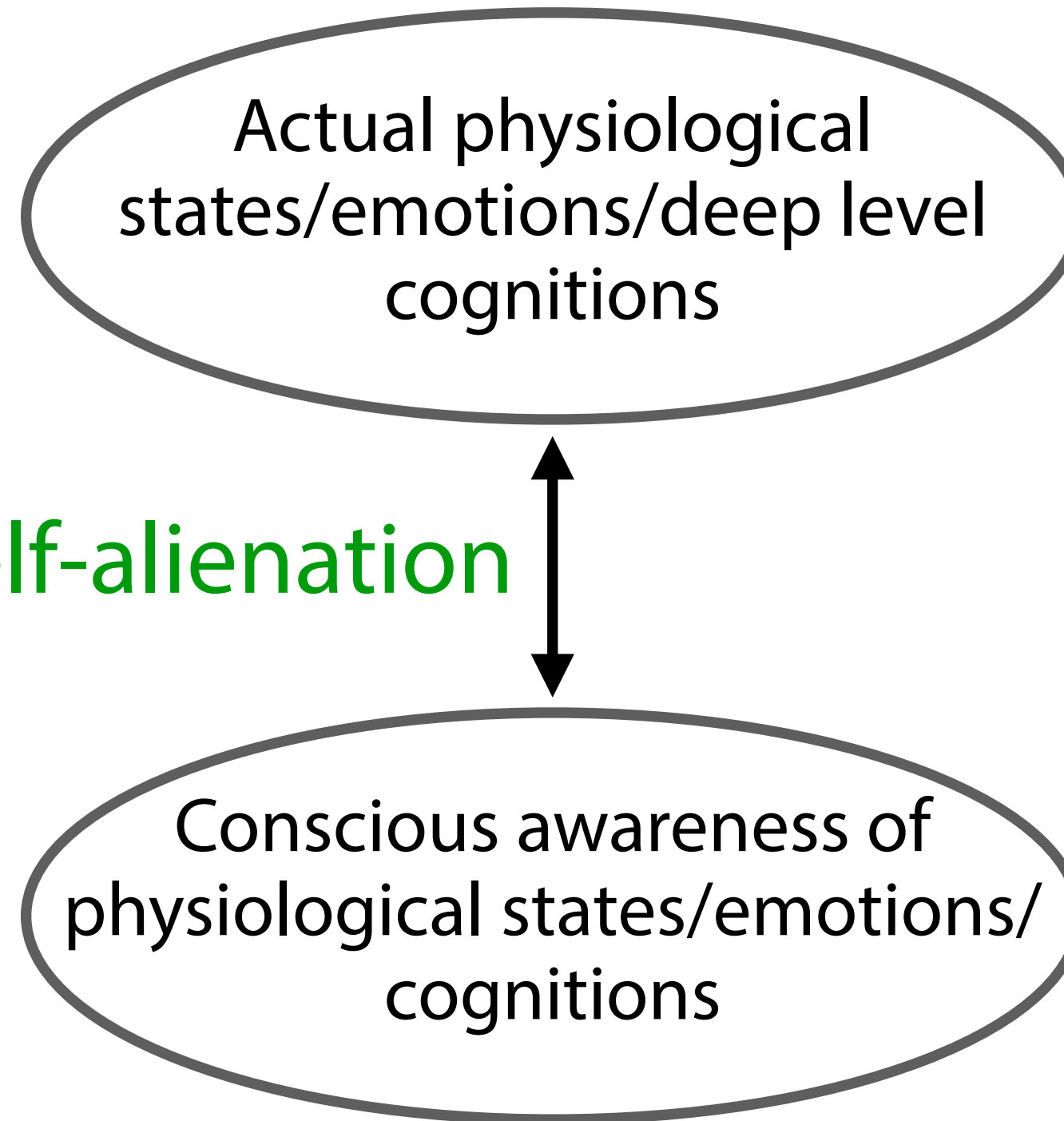
Authenticity Scale is one of the measures often used for evaluating the outcome of executive coaching and consists of three key parts: (1) Self-alienation, (2) Authentic living, and (3) Accepting external influence. We will briefly explain each factor.

Authenticity Scale
[66]

(1) Self-alienation

Actual physiological states/emotions/deep level cognitions

Conscious awareness of physiological states/emotions/ cognitions

[66] Wood, Alex M., et al. "The authentic personality: A theoretical and empirical conceptualization and the development of the Authenticity Scale." *Journal of Counseling Psychology* 55.3 (2008): 385.

(1) Self-alienation is the unavoidable discrepancy between one's actual experience (true self) and their conscious awareness, indicating that the individual goes through the experience of not knowing oneself, or feeling out of touch with the true self. An example questionnaire item is "I don't know how I really feel inside."

Authenticity Scale
[66]

Actual physiological states/emotions/deep level cognitions

(1) Self-alienation

Conscious awareness of physiological states/emotions/ cognitions
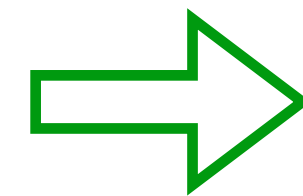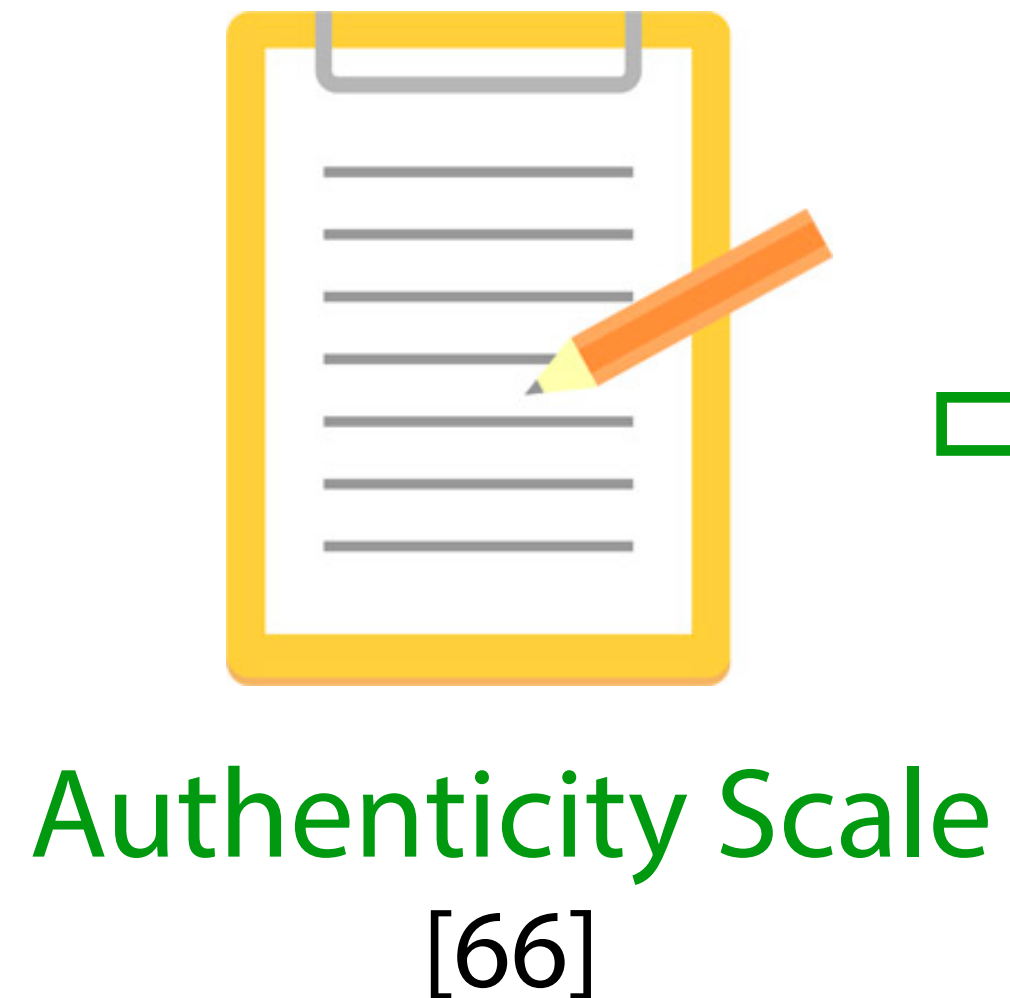
Behavior and emotional expression

(2) Authentic living

[66] Wood, Alex M., et al. "The authentic personality: A theoretical and empirical conceptualization and the development of the Authenticity Scale." *Journal of Counseling Psychology* 55.3 (2008): 385.

(2) Authentic living considers the extent to which an individual expresses emotions and behaves that are consistent with their awareness of internal states. An example questionnaire item is "I always stand by what I believe in."

Authenticity Scale
[66]

Actual physiological states/emotions/deep level cognitions

Social-Environment

(1) Self-alienation

(3) Accepting external influence

Conscious awareness of physiological states/emotions/ cognitions

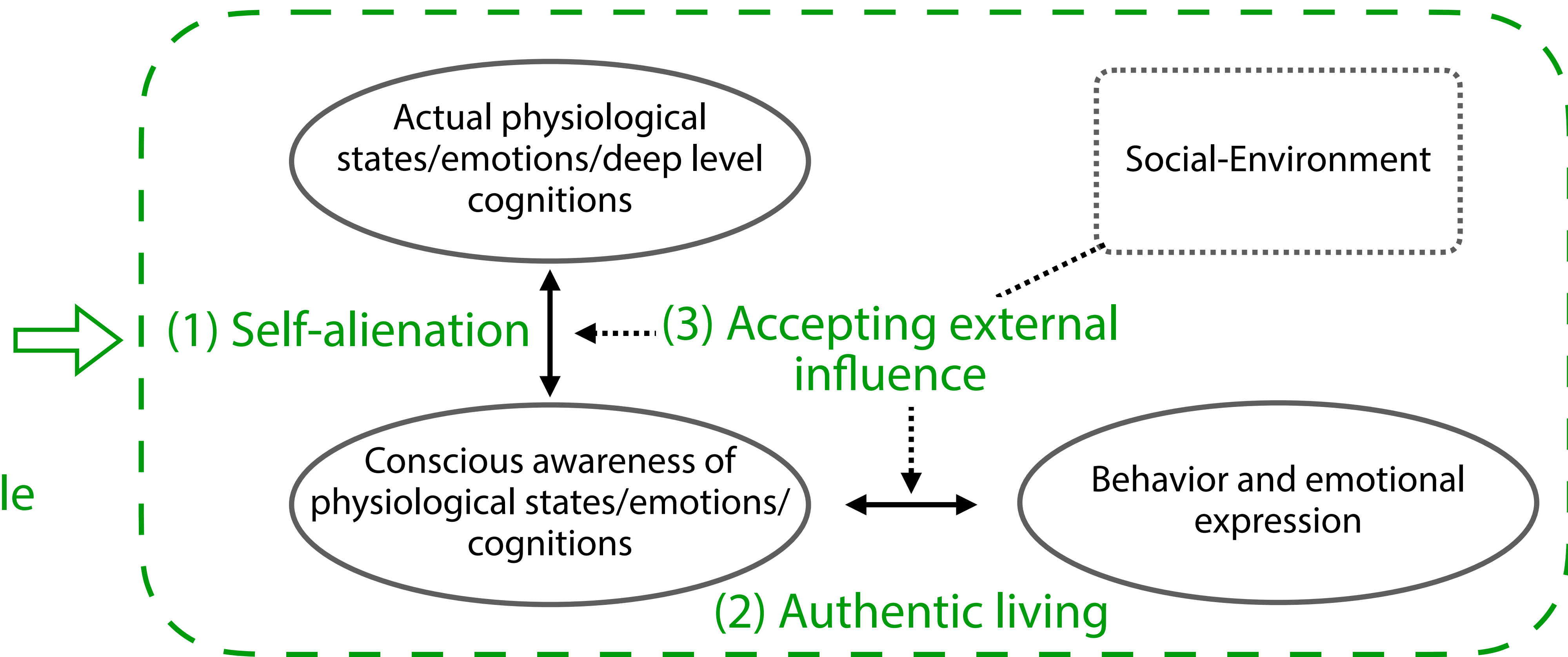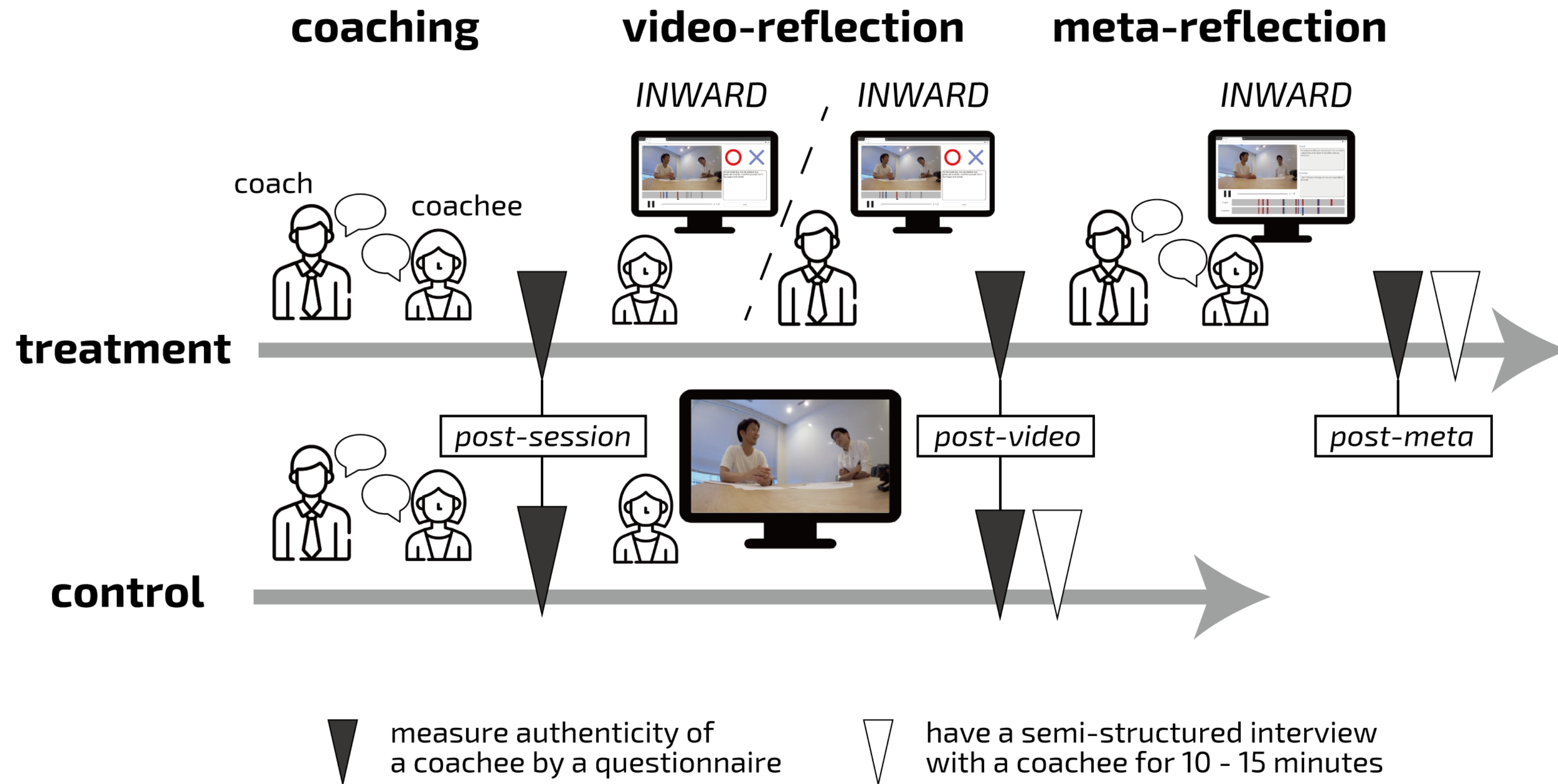Behavior and emotional expression

(2) Authentic living

[66] Wood, Alex M., et al. "The authentic personality: A theoretical and empirical conceptualization and the development of the Authenticity Scale." *Journal of Counseling Psychology* 55.3 (2008): 385.

(3) Accepting external influence means the tendency of an individual to accept the influence of others, which accounts for the external effects of their social environment. An example questionnaire item is "I am strongly influenced by the opinions of others."

coaching **video-reflection** **meta-reflection**

INWARD *INWARD* *INWARD*

coach coachee

treatment

post-session *post-video* *post-meta*

control

▼ measure authenticity of
a coachee by a questionnaire

▽ have a semi-structured interview
with a coachee for 10 - 15 minutes

This figure illustrates the procedure for both the treatment and control group. As we have shown in the video, the treatment group had three processes. In contrast, the control group had two processes without INWARD. Coachees in both groups took a questionnaire for measuring authenticity after each step and had a semi-structured interview at the end.
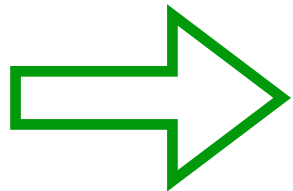
25

Measurement of Reflection *Efficiency*

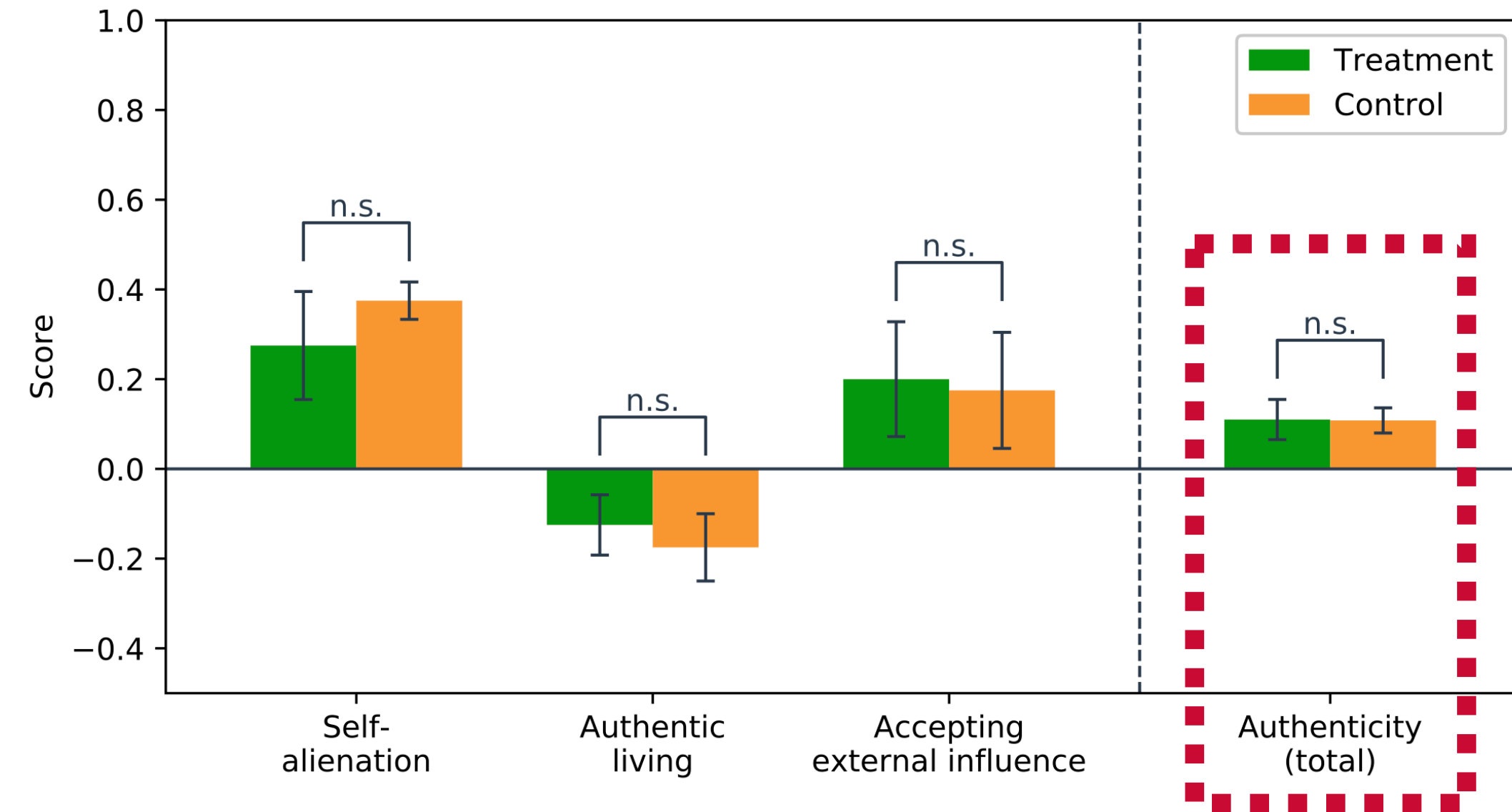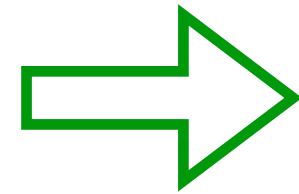|	Average duration		Difference
	Coaching session	Reflection process	
Treatment	47.2 min (± 1.6 min)	18.8 min (± 2.5 min)	-28.4 min (± 2.6 min)
Control	42.7 min (± 1.0min)	45.3 min (± 4.2 min)	+2.0 min (± 4.8 min)

Time

Now, we will show our results. From this table, it is clear that the time required to conduct the video reflection process was crucially reduced by INWARD.

Measurement of Reflection *Effectiveness*


Authenticity Scale

The difference of Authentic Scale scores between post-session and post-video

On the other hand, while the video-reflection process in both groups improved the authenticity score, their effectiveness was not significantly different regardless of the use of INWARD.

Results: Efficiency and Effectiveness of Video-Reflection (H1)

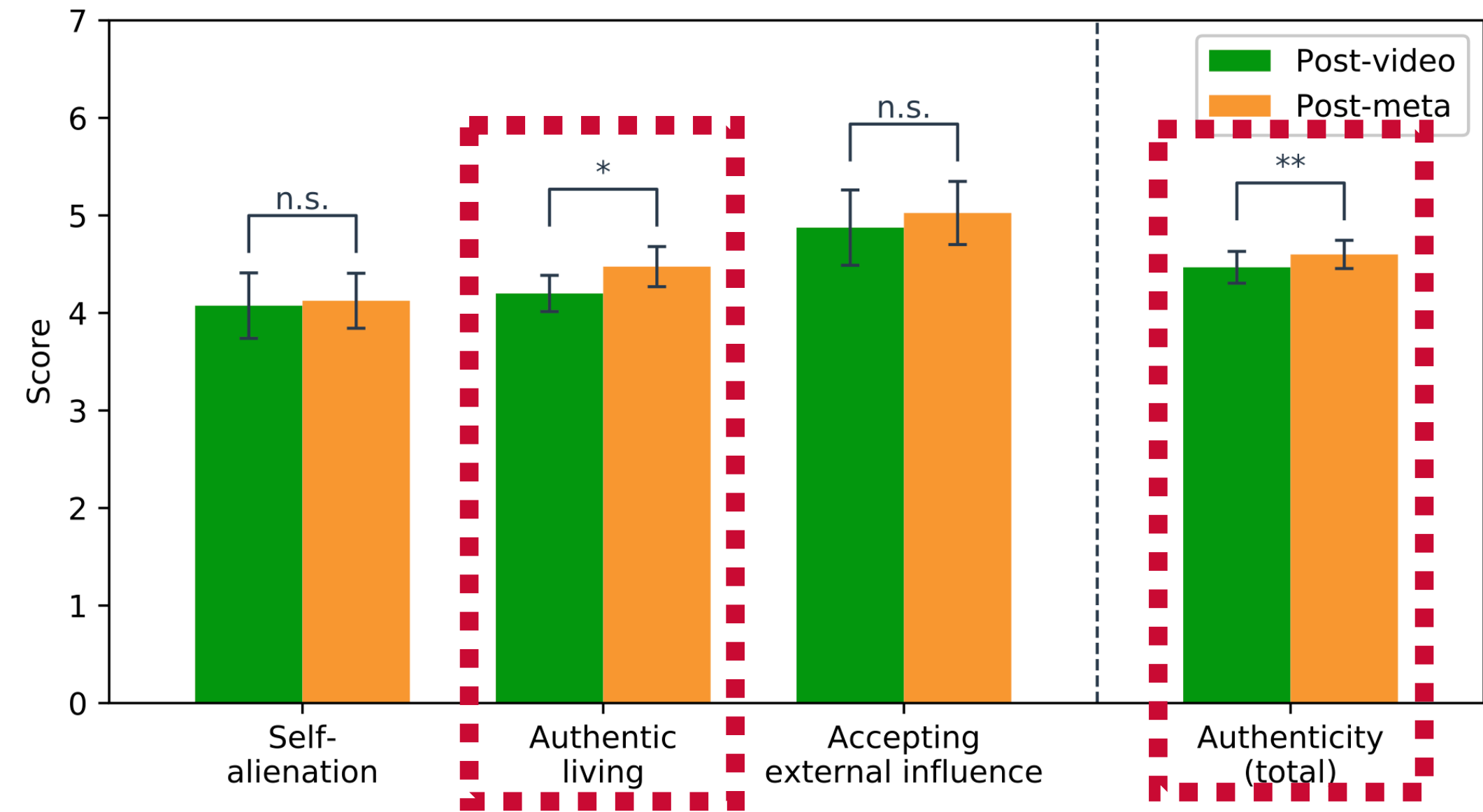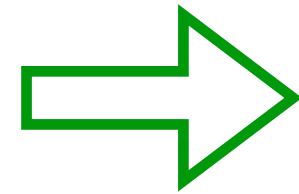|		H1	Result
INWARD	Time	reduce	reduced
	Authenticity Scale	improve	not improved
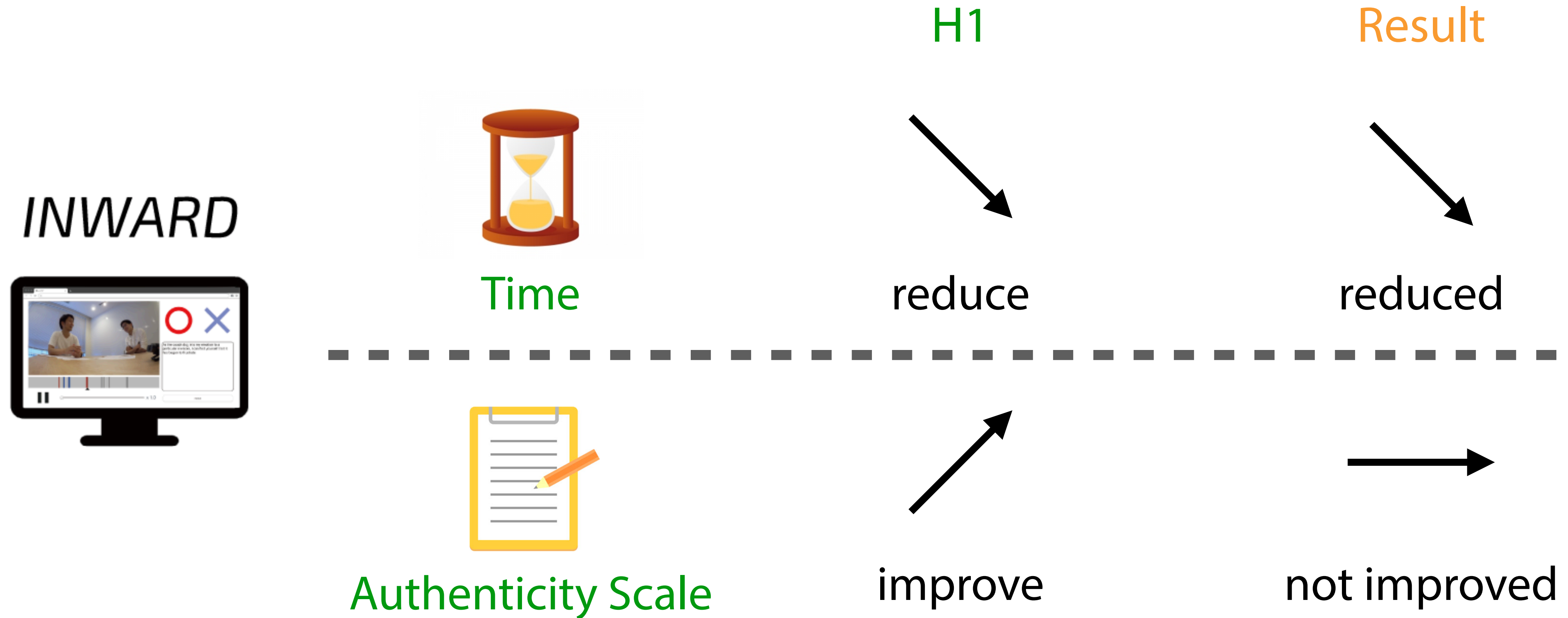
From these results, H1 is partially supported by the study, that is, the reflection process provided by the tool is more efficient but cannot be said to be more effective than watching the entire video without the assistance of tools.

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Measurement of Reflection *Effectiveness*

Authenticity Scale

The difference of Authentic Scale scores
between post-video and post-meta

The figure shows the change in the score of authenticity through the meta-reflection process in the treatment group. The result confirms that the meta-reflection process is supported by INWARD with a significant increase in Authenticity Scale, especially in Authentic living.

INWARD

Authenticity Scale

H2

improve

Result

improved

From this result, H2 is supported by the study.

Through the entire process
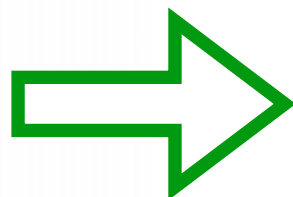
	Entire Process
Treatment	41.0 min (± 2.9 min)
Control	42.7 min (± 1.0min)

Time

Authenticity Scale
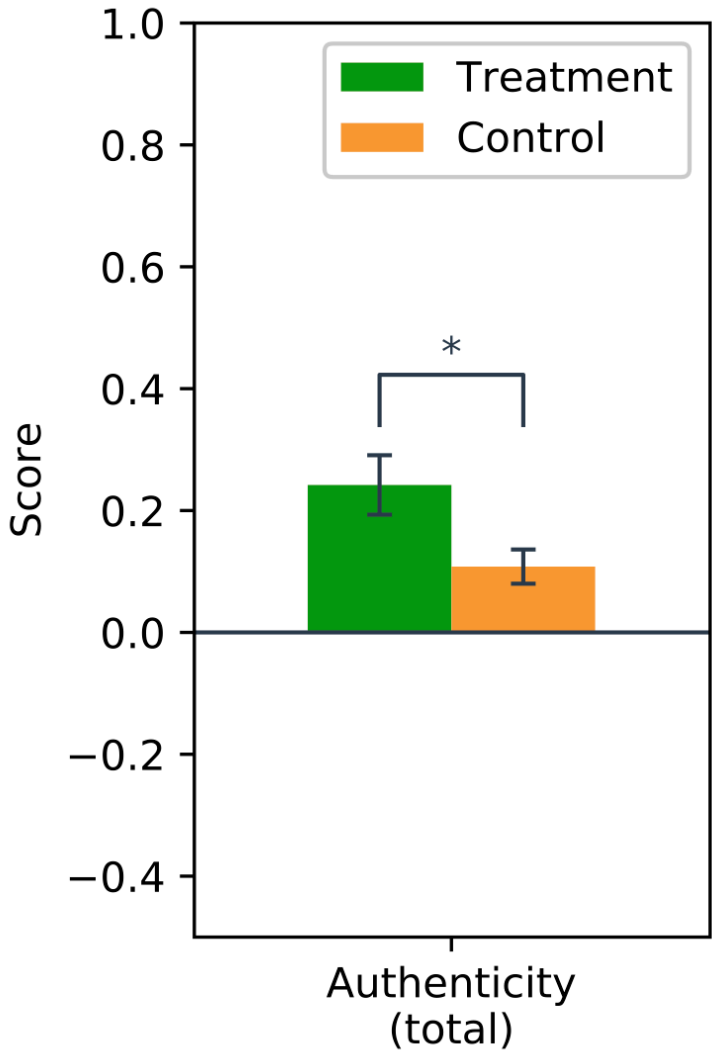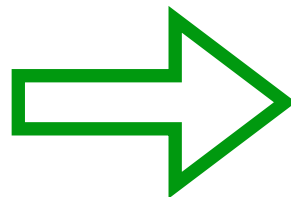
The difference of Authentic Scale scores in the treatment and control groups

The time required for the entire process was not significantly different between the treatment and control group. Therefore, we conclude that the difference in the efficacy between the control and treatment groups shown in the figure is not due to the coachees in the treatment group spending more time.

Results: User Comments

- How Coachees are Affected via Video-Reflection

- How Coachees are Affected via Meta-reflection

- Usability

- Further Possibilities for Computer-Supported Coaching

For the result of the semi-structured interview, please see our paper.

- Implications for Facilitating Reflection Using Computers

- Relevance to Prior Studies Facilitating Reflection at Work

Finally, we provide discussion in two directions: implications for facilitating reflection using computers and relevance to prior studies facilitating reflection at work.

- Implications for Facilitating Reflection Using Computers

  - Necessity for Meta-reflection after Video-Reflection

    → to ameliorate authentic living which gets lower through video-reflection

One finding is the necessity for meta-reflection after video-reflection. Our result suggests that video-reflection degrades authentic living because users gain an objective perspective through self-reflection and notice discrepancies between their outward expression and internal states. Therefore, it is recommended to have an opportunity to discuss those points as meta-reflection.

Discussion

- Implications for Facilitating Reflection Using Computers

    - Necessity for Meta-reflection after Video-Reflection

        → to ameliorate authentic living which gets lower through video-reflection

    - Effectiveness of Providing Grounds for Discussion by Computers

        → to avoid an unconscious bias of listening to coaches' opinions

Another finding is that our design of having reflection individually on candidate scenes detected automatically by computers is favored by some participants. Their comments suggest that providing grounds for discussion by computers is more effective by enabling their judgment to be independent of the coaches' perspectives, which can lead to a constructive discussion in meta-reflection.

- Implications for Facilitating Reflection Using Computers

  - Necessity for Meta-reflection after Video-Reflection

    → to ameliorate authentic living which gets lower through video-reflection

  - Effectiveness of Providing Grounds for Discussion by Computers

    → to avoid an unconscious bias of listening to coaches' opinions

- Relevance to Prior Studies Facilitating Reflection at Work

  - While prior studies aimed to increase reflection opportunities at the workspace, our study focuses on amplifying the effect of reflection with a consideration of internal changes.

Lastly, we discuss the relevance of our work to existing studies about reflection in the workplace. For the details, please refer to our paper.

- We examined the possibility of **evolving the video-reflection process for executive coaching** by providing our computer-based supporting tool *INWARD*.

    - present important scenes automatically detected by human behavior analysis.

    - offer an opportunity for meta-reflection

- Our user study showed that *INWARD* successfully **reduces the time of video-reflection** and **improves an individual's authenticity** via the entire reflection process.

- These findings support our hypotheses while opening opportunities to utilize computers further to assist coaching in benefiting the field of human resource development.