## Abstract

Emotions and impressions people feel when looking at a particular visual artwork vary from person to person. To examine these differences in impressions, this study collected and analyzed the emotion categories that people felt appropriate and freely described texts. Conventional studies investigating individual differences in emotions have mainly looked at emotions selected by people from a small number of emotion categories. In this study, we collected many pairs of eight emotion categories and free descriptions along with personal attributes for each painting and evaluated them objectively and quantitatively using natural language analysis techniques and statistical analysis. As a result, the categories and words likely to be selected and used by each attribute were clarified. During this analysis, we developed a model for estimating people's impressions that is useful for communication support by a system that interacts with people and for adapting the model to each individual.

## Summary

### Comparison between attributes for understanding individual differences in impressions of visual art
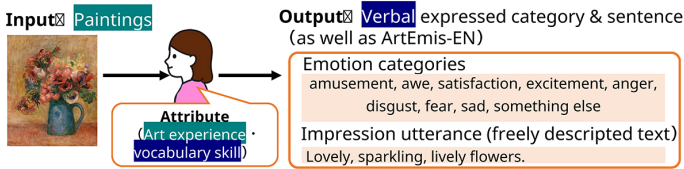
Conventional researches on emotions / impressions mainly focus on a small number of basic emotion categories. This study focus on complex emotion categories and free descriptions to examine differences between people.
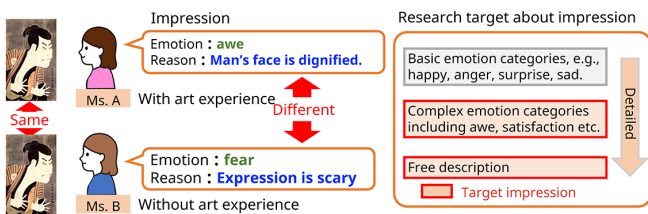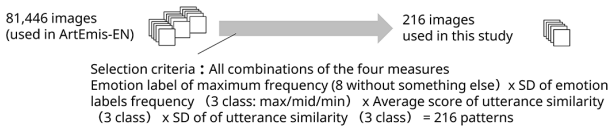


We investigate the relationship between the impressions and their personal attributes, especially for paintings that are created for inducing human emotions [1].

## Impression Data Collection

Referring to a previous study of impressions of paintings conducted in English-speaking countries (ArtEmis-EN), we collect 8 emotion categories toward paintings and freely described impression utterance from Japanese subjects (ArtEmis-JP).



**Input:** Paintings
**Output:** Verbal expressed category & sentence (as well as ArtEmis-EN)

Emotion categories
amusement, awe, satisfaction, excitement, anger, disgust, fear, sad, something else

Impression utterance (freely described text)
Lovely, sparkling, lively flowers.

**Attribute** (Art experience・vocabulary skill)

**Painting selection**   Select 216 paintings from ArtEmis-EN to efficiently collect with ensuring large number of people per painting.

81,446 images (used in ArtEmis-EN) → 216 images used in this study

Selection criteria: All combinations of the four measures
Emotion label of maximum frequency (8 without something else) x SD of emotion labels frequency (3 class: max/mid/min) x Average score of utterance similarity (3 class) x SD of of utterance similarity (3 class) = 216 patterns

**Participants & Data**   Enable detailed comparison between with / without art experience by collecting more than 50 persons per 1 painting. (Total 539 persons)

| | (Art) Expert | Non-expert |
|---|---|---|
| Number | 263 | 276 |
| Age | 32.4±4.6 | 32.9±4.7 |
| Sex | 78M-185F | 100M-176F |

539 persons × 30 paintings = 16,170 pairs of emotion category and utterance
* 30 paintings per person
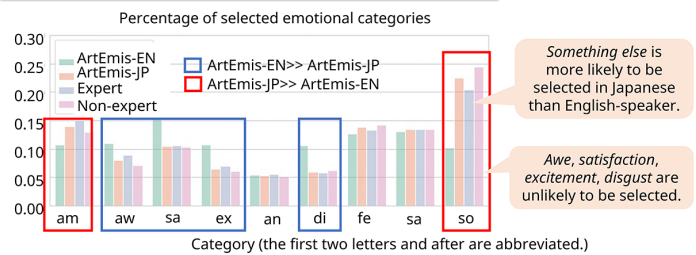* 74.86±9.41 person per painting

† Panos Achlioptas, Maks Ovsjanikov, Kilichbek Haydarov, Mohamed Elhoseiny, Leonidas Guibas. Artemis: Affective language for visual art. In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition, pp. 11569-11579, 2021.

## Difference in Emotion Categories

Differences between English vs. Japanese-speaker were analyzed using the most frequent category for the same painting with inter-attribute comparison.

**Frequency comparison of selected emotional categories**

**Japanese speaker selects something else more than satisfaction, excitement, disgust.**



Percentage of selected emotional categories

Category (the first two letters and after are abbreviated.)

*Something else* is more likely to be selected in Japanese than English-speaker.

*Awe, satisfaction, excitement, disgust* are unlikely to be selected.

**Inter-attribute comparison of most frequent categories for the same painting**

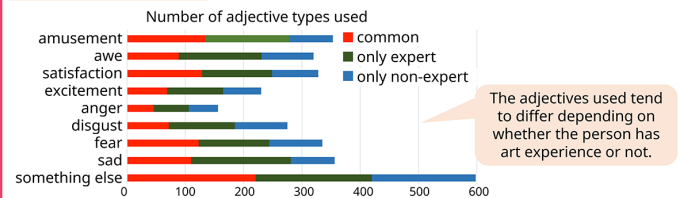**Japanese selects *fear* than *anger*.**     **Expert close to English speaker emotions.**

English vs. Japanese (-speaker)
· Japanese categorize *excitement* as *amusement*.
· Japanese categorize *disgust*, *anger* as *fear*.

Expert vs. Non-expert
· Selection tendencies in Japanese are relatively similar regardless of with / without art experience.
· *Satisfaction*, *excitement*, *anger* are selected most frequently by expert.

## Difference in Impression Utterances

Quantitative evaluation of depictions' differences with / without art experience by morphological analysis of utterances and comparison of accuracy and examples using utterance generation models from paintings.

**morphological analysis**    Focus on adjectives which often express emotion.



Number of adjective types used

- common
- only expert
- only non-expert

The adjectives used tend to differ depending on whether the person has art experience or not.

**Utterance generation accuracy & examples**    Which is easy to estimate?

※ BLEU-3 is a measurement to evaluate sentence generation based on 3-gram.

| Training data | Test data | BLEU-3 |
|---|---|---|
| Expert | Expert | 0.604 |
| Non-expert | Expert | 0.556 |
| Non-expert | Non-expert | 0.627 |
| Expert | Non-expert | 0.500 |

Non-expert is easier to estimate ≒ more likely to use similar words.

ArtEmis-EN translated-JP model → The man looks serious.
Expert model → The man's expression looks sad.
Non-expert model → His expression is scary.

The ways of perceiving expression and gestures are different.

Painting quotes: https://www.wikiart.org/en/edvard-munch/self-portrait-1886

## References

[1] H. Narimatsu, R. Ueda, S. Kumano, "Cross-Linguistic Study on Affective Impression and Language for Visual Art Using Neural Speaker," in *Proc. 10th International Conference on Affective Computing and Intelligent Interaction* (*ACII*), 2022.

## Contact

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