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Gender-Based Analysis of User Reactions to Facebook Posts

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Abstract: Online Social Networks (OSNs) are based on the sharing of different types of information and on various interactions (comments, reactions, and sharing). One of these important actions is the emotional reaction to the content. The diversity of reaction types available on Facebook (namely FB) enables users to express their feelings, and its traceability creates and enriches the users' emotional identity in the virtual world. This paper is based on the analysis of 119 875 012 FB reactions (Like, Love, Haha, Wow, Sad, Angry, Thankful, and Pride) made at multiple levels (publications, comments, and sub-comments) to study and classify the users' emotional behavior, visualize the distribution of different types of reactions, and analyze the gender impact on emotion generation. All of these can be achieved by addressing these research questions: who reacts the most? Which emotion is the most expressed?

Key words: profiling; knowledge extraction; data mining; emotion mining; social media; data crawling; Facebook reactions; gender

1 Introduction

Social reactions are a new vast area for research on uses' behavior[1, 2], where people have a paralinguistic opportunity to express emotions[3–5]. The initial objective is to interact with social media content, which has been transformed into a potential tool to convey attention and emotion. Many studies argue the polarity and the correlation of reactions on Online Social Networks (OSNs)[6, 7] with emotional expressions[8]. The appearance of such reactions is based on the results of several studies since the 1980s[9, 10], that have highlighted the role of emotions as an explanatory factor and influence to determine human behavior. To describe the set of emotions, we present two of the most known approaches: dimensional[11, 12] and categorical[13, 14].

- In 1980, Russell[15] proposed the dimensional approach to represent emotions in 2D space (see Fig. 1), where four bipolar opposites intersect: activation (weak and strong) and valence (negative and positive)[16].
- Among the approaches, the categorical approach is the most widespread and considers emotions as episodic and universal characteristics[17]. This approach is based on a set of so-called basic, universal, non-reducible, and innate emotions. Ekman distinguishes six basic emotions[18, 19]: Joy, Disgust, Anger, Fear, Sadness, and Surprise (see Fig. 2).

In 2002, Mark Zuckerberg set up a network that connects students, first called Facemash, then Facebook※ (FB) in 2004[20–22]. Five years after, FB launched the "Like" button, an e-emotion represented by the thumb in the air, which remains the most popular reaction by a wide margin[23]. Quite quickly after, FB received strong requests to integrate a

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※https://www.facebook.com/

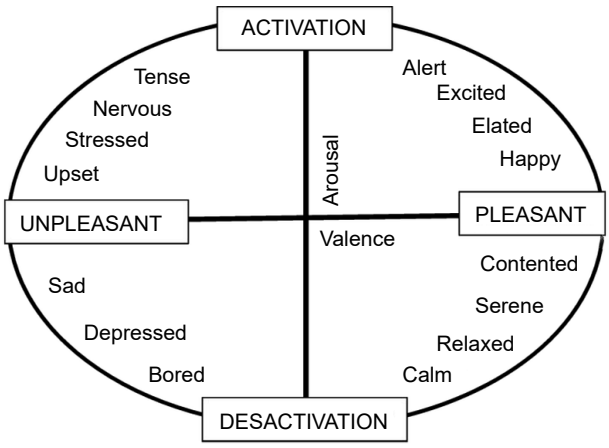

Fig. 1 Circumplex model from Russell (1980).

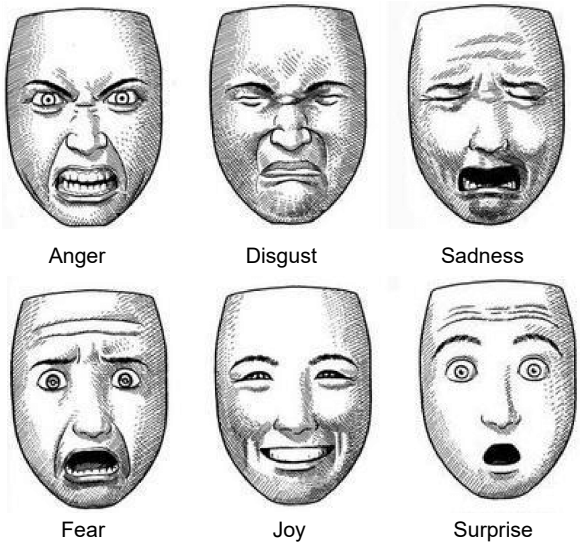

Fig. 2 Basic six emotions according to Eckman (1992).

"Dislike" button. In February 2016[24, 25], FB offered a major update by adding five reactions alternative to the basic "Like" type: "Love", "Haha", "Wow", "Sad", and "Angry"[26]. Figure 3 provides the correlation between the FB reactions and Eckman's six basic emotions[27].

From time to time, and on occasion, FB launches new additional reactions, such as:

• Thankful: FB went live on Mother's Day, May 29, 2016, to allow users to express their feeling of thanks to their moms using this reaction[28].

• Pride: On June 2017, FB released a pride reaction button (a waving rainbow flag). The Pride button can be used to signal queer solidarity or to queer others' posts. Researchers discovered that the Pride button was not universally available. FB announced that this reaction is available for people who follow the company's LGBTQ page[29, 30].

Ekman's six emotion	Facebook reaction	
Joy	Like	
	Love	
	Haha	
Surprise	Wow	
Sadness	Sad	
Anger	Grrr	
Disgust	—	—
Fear	—	—

Fig. 3 Correlation between FB reactions and Ekman's six emotions.

• Solidary: In 2020, FB launched a new reaction with the "Solidarity" button to show commitment and support in the difficult time of isolation related to the coronavirus disease 2019[31].

The quest for e-emotions initiated by FB is such a revolution that most other complex systems[32, 33] soon followed suit. Instagram picked up the principle in 2018. In April 2019, LinkedIn enabled reactions through the emoticons "Like", "Bravo", "Love", "Informative", and "Interesting". In September 2021, Twitter[34] initiated the tweet reactions test with limited emojis†. This new feature allows users the opportunity to respond to tweets with a selection of at least five pre-determined emojis in addition to the standard reply and quote tweet options. By carrying out a case study on the most popular OSN, Facebook, this study examines the usage of emotions as prospective features and attempts to determine the gender effect on emotion generation. Three research questions are presented below to serve as the basis for the experimental study in this work:

• RQ1: Who reacts the most? Women or men?

• RQ2: Do users freely express multiple emotions, or

†https://mashable.com/article/twitter-tests-tweet-emoji-reactions

is there a tendency to express the same emotion?

- RQ3: Does gender affect emotion distribution?

2 Related Work

On the basis of these reactions, several researchers have studied the link between emotions and posts by political parties[35], scientific literature[36, 37], news consumption feedback[38], and news controversy[39–41]. Others study the effect of signals related to FB users' reactions to information retrieval[42]. In addition, several works provide responses to how people use social media to share and manage emotions in both network-visible and private communication channels[43], while others propose and evaluate alternative methods for predicting these reactions to user posts on public pages of firms/companies (such as supermarket chains)[44]. For user content moderation[45], FB implemented the EdgeRank algorithm that determines which posts to place and in what order in each user's FB feed. In fact, the algorithm calculates the score of each publication and ranks them in descending order, not chronologically, for each user. From 2017, FB started to weigh reactions more than classic "Like" as a parameter of the EdgeRank algorithm‡.

3 Methodology

3.1 Overview

This study is based on the analysis of FB reactions. First, the first characteristic vector of each user is calculated, including the full name and gender. After we determine the total of reactions, followed by the total of reactions except for the classic "Like". Then, we add a specific number that represents the number (not a total) of the other emitted reaction types, and finally, we place the total reactions of each type. Let us use the following:

- **All**: total of all reaction types;
- **Others**: total of other reaction types without the "Like" type;
- **Nbr_others**: number (not a total) of other reaction types expressed by a user without the "Like" type, so

$$\begin{cases} \text{All} = \text{Others} + \text{Like}, \\ \text{Nbr\_others} = [0-7] \end{cases} \quad (1)$$

As a result, we define the characteristic vector of users as follows:

$$\text{Reaction [user]} = [\text{Full\_Name, Gender, All, Others, Nbr\_others, Like, Love, Haha, Wow, Sad, Angry, Thankful, Pride}]$$

3.2 Levels ranking

To better characterize user reactions, we define three level vectors as follows:

- **L1:** Corresponds to reactions performed for publications; the vector is expressed as Reaction $[\text{user}]_{L1}$.
- **L2:** Corresponds to reactions performed for comments; the vector is expressed as Reaction $[\text{user}]_{L2}$.
- **L3:** Corresponds to reactions performed for sub-comments; the vector is expressed as Reaction $[\text{user}]_{L3}$.

The sum of the three vectors defined for each user allows us to have a multi-level reaction vector named "Reaction_Global", which corresponds to

$$\text{Reaction\_Global [user]} = \text{Reaction } [\text{user}]_{L1} + \text{Reaction } [\text{user}]_{L2} + \text{Reaction } [\text{user}]_{L3} \quad (2)$$

Using this ranking, we analyze and classify users based on their level of interest.

3.3 Like-based ranking

After the "Reaction_Global" vector calculation, we observe that the "Like" type can be used as an additional criterion for ranking. Indeed, we notice that several users only use different reaction types rather than "Like", thus allowing us to divide users into two classes:

- **C1:** Those who mix between the "Like" and another reaction type (Like! = 0).
- **C2:** Those who only react with another reaction type without the "Like" type (Like = 0). The methodology schema is shown in Fig. 4.

3.4 Gender determination process

When collecting data, we are faced with a number of limitations, one of which is that the user makes his or her personal information private (such as gender and birthday). Either by confidentiality or by lack of information (the user does not mention gender when creating the account), this limitation forms the invisible part of the so-called "iceberg"[46]. However, this factor does not hinder the continuation of our studies, and in fact, we have implemented a system of recovery for these gaps. To determine the users' gender, we use the attribute "Full_Name" broken down by extracting the words separated by a space. These words are compared

‡https://blog.hootsuite.com/facebook-algorithm/

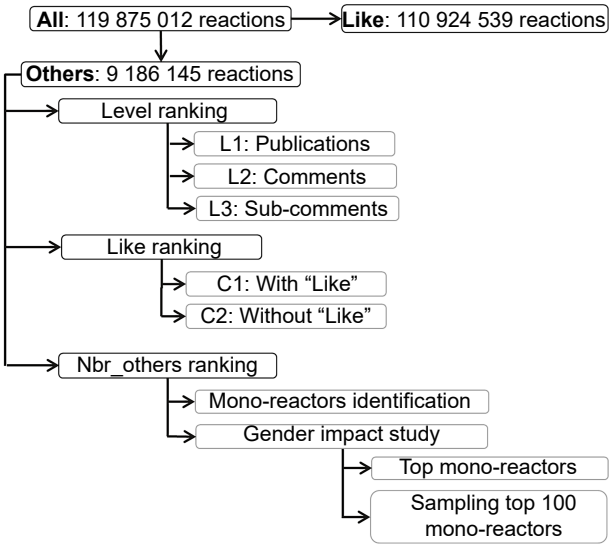

Fig. 4 Displays all steps of the methodology schema.

with a database[47] of names' gender, and then we calculate a total score of the Full_Name to decide the gender of the user. The pseudo-code of this algorithm is illustrated as Algorithm 1. We use

- nbr_M: A total of words refers to men's names.
- nbr_F: A total of words refers to women's names.
- First: Character that refers to the gender of the first word in the full name.

For the gender determination step, we consider the following cases:

Case 1: The gender is declared women if :

$$\begin{cases} \text{nbr\_M} = 0 \text{ and } \text{nbr\_F} > 0, \\ \text{First} = \text{“}F\text{”}, \ \text{nbr\_F} = 1, \text{ and } \text{nbr\_M} > 1 \end{cases} \tag{3}$$

Examples are in Table 1.

Case 2: The gender is declared men if :

$$\begin{cases} \text{nbr\_F} = 0 \text{ and } \text{nbr\_M} > 0, \\ \text{First} = \text{“}M\text{”}, \ \text{nbr\_M} = 1, \text{ and } \text{nbr\_F} > 1 \end{cases} \tag{4}$$

Examples are in Table 2.

Several cases show full names containing special characters (especially the last name), which makes them undeterminable by gender using the names' gender database. Thus, to remedy those special cases, we manually detect and arbitrate the common last names. Table 3 presents the examples.

Thus, we can determine the gender of 81% of the database users.

4 Data Description

Using a semi-supervised data collection, we obtain a set of 119 875 012 reactions posted between 2009 and 2018 on 3.5 million posts to approximately 29 million comments and finally to 2.3 million sub-comments within 363 entities (groups and public pages of FB).

Algorithm 1 Gender determination algorithm based on Full_Name attribute

```
L ← List of names gender database
F ← List of users' full names
Score ← { }
while Length (F) > 0 do
    nbr_M ← 0;
    nbr_F ← 0;
    i ← 0;
    First ← "";
    N ← Pop (F);                ▷ Get the full name in the head
    W ← Split (N);              ▷ Split the full name to words using space
    while Length (W) > 0 do
        M ← Pop (W);            ▷ Get the word in the head
        Gender ← "";
        if M ∈ L then
            Gender ← L(M);      ▷ Get the word's gender
        end if
        if Gender = "Men" then
            nbr_M ← nbr_M + 1;
            if i = 0 then
                First ← "M";    ▷ Save the first gender
            else
                i ← 1;
            end if
        else
            if Gender = "Women" then
            nbr_F ← nbr_F + 1;
            if i = 0 then
                First ← "F";    ▷ Save the first gender
            else
                i ← 1;
            end if
        end if
    end if
end while
Score{N} ← (First; nbr_M; nbr_F);
Gender_Determination (Score {N});
end while
```

Table 1 Users' full names that start with women's first name.

Name	Gender
Laetitia Anthony Lucas	*F*
Malika Ben Moussa	*F*

Table 2 Users' full names that start with men's first name.

Name	Gender
Cesar Rosa Maria	*M*
Taoufik Aboo Maha Maya	*M*

Table 3 Examples of manually arbitrated last names.

Last name	Gender
Ãñas	*M*
Ãÿøüb	*M*
MëŘým	*F*

Figure 5 displays the exact numbers.

Given that the "Like" button has been the first reaction used since 2009[48–50], 92% (110 924 539) of the reactions are of this type, while 8% (9 186 145) are reactions of the other types (see Fig. 6). Table 4 shows the distribution by type of the 9 million reactions.

First, we notice that almost all records (81.42%) are represented by "Love" (4 536 272) and "Haha" (2 942 864), two reactions expressing joy in Ekman's model (see Fig. 3). "Sadness" follows with 7.12% (654 487) of reactions using "Sad" type. The "Wow" reaction type is the third, with 6.15% (564 897) of

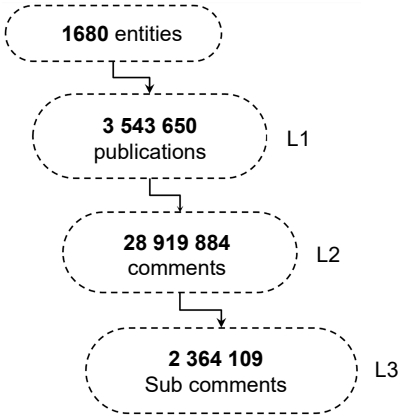

Fig. 5 Statistics of the collected data on reactions.

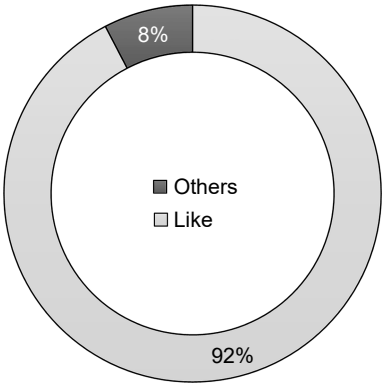

Fig. 6 Reaction distribution using the "Like" type.

Table 4 Distribution of the 9 million other reaction types.

Reactions type	Total	Percentage (%)
Love	4 536 272	49.38
Haha	2 942 864	32.04
Sad	654 487	7.12
Wow	564 897	6.15
Angry	474 997	5.17
Thankful	11 766	0.13
Pride	862	0.01
Total	9 186 145	100

records expressing surprise. Finally, the "Angry" reaction type is represented with 5.17% (474 997).

For the other occasional reaction types, "Thankful" and "Pride", we observe low rates of collected records, 0.13% and 0.01%, respectively. The "Solidary" type is not present in our dataset because the data collection ended in 2018 due to multiple restrictions imposed by FB after the Cambridge Analytica Scandal[51, 52].

5 Global Result

5.1 Reactors behavior

Historically, FB added reactions to comments§ on May 3, 2017[53], while sub-comments were inserted after. As a result, the majority (89%) of studied reactions are made at L1, even if the collected data contain approximately 13 million reactions to L2 and L3.

Table 5 displays the distribution of collected reactions by level. In addition, Table 5 shows the number of unique users found at each level after the vector calculation. Thus, approximately 26 million users express around 107 million reactions for L1, 4.3 million users express 11.5 million reactions for L2, and finally, approximately 860 thousand users express around 1.5 million reactions for L3. The majority of users are attracted by L1, but interesting minorities react to L2 and L3.

At the end of the merging operations of the different vectors, the size of the Reaction_Global vector is

Table 5 Reaction vector details for each level.

Level	Number of reactions	Percentage (%)	Number of users	Mean (reactions /users)
L1	106 910 523	89.18	26 414 136	4.10
L2	11 448 906	9.56	4 298 486	2.90
L3	1 515 583	1.26	862 768	1.37

§https://mashable.com/article/facebook-reactions-in-comments

29 259 895, of which 89% react only with a "Like" (Nbr others = 0). As a result, 3 173 537 (11%) users are the target for further analysis, of which 9 186 145 are "Other reactions". Among this part, we notice that 39% (1 232 083) belong to C2. Table 6 displays the number of reactions and users for each class.

5.2 Reactors distribution by categories

The "Nbr_others" field allows us to determine the number of other reaction types other than "Like" that a user has expressed, which allows us to classify the users into seven categories (we study the 2 occasional types in addition to the 5 initial ones):

(1) Mono-reactors: This category defines users who tend to express only one reaction type. These users choose, regardless of time and content, only one reaction; these users represent the majority at 81% (2 581 986) and approximately half (1 144 410) are C2.

(2) Bi-reactors: These users are interested in expressing only two reaction types, which allows us to study reaction correlation. These users represent 13% (424 226) of the sample, of which 19% are C2.

(3) Tri-reactors: Only 4% (116 235) of users are satisfied with using three reaction types, of which 9% are C2.

(4) Tetra-reactors: A total of 36 323 users mix four reaction types, of whom 4% are C2. We notice that the average reaction type is starting to increase.

(5) Penta-reactors: These users enjoy putting the reaction they want, representing 0.4% of the sample, of which 1.4% are C2.

(6) Hexa-reactors: Only 970 users express all the reactions except one type, considered a minority who produce 300 489 reactions. Thus, the average is 310 reactions for each user.

(7) Hepta-reactors: As a special category, these users are able to react with all the possible reaction types. This category has 12 people with a maximum average of 595 reactions each.

We observe that 98% of users are represented by the three first categories, which allows us to deduce that users tend to always use one and the same reaction type (81%). If not, users attempt not to exceed three types (13% of users use two types, and 4% use three types). The remaining 2% is made up of users with various reaction types and have a high average of reactions. We also notice that this group has a low rate of C2 (even zero for the most diverse: hexa- and hepta-reactors).

Figures 7 and 8 show a closer concentration of values on the left and a smaller interquartile, which indicates positively skewed and reliable data (low boundary in the dataset). The mean is greater than the median (mean > 3rd quartile for Penta- and Hexa-reactors), which means the existence of a proportion of users that produce a huge number of reactions (a kind of addiction to reaction types: for example, a Hexa-reactor has reacted 13 620 times, another Penta-reactor has reacted 6815 times). Mono-reactor dispersion is illustrated in Table 7. The results show that most users react less than four times, and only less than 2% express more than four reactions, which represents a right-skewed distribution.

Table 6 Ranking of 9 million other_reactions by class.

Class	Number of reactions	Number of users	Mean (reactions/users)
C1	7 492 557	1 941 454	3.86
C2	1 693 588	1 232 083	1.38
Total	9 186 145	3 173 537	2.89

5.3 Reaction types distribution by category

In Section 4, we find that 81% of reactions are represented by the types "Love" and "Haha", which define the character of users' tendency to interact with

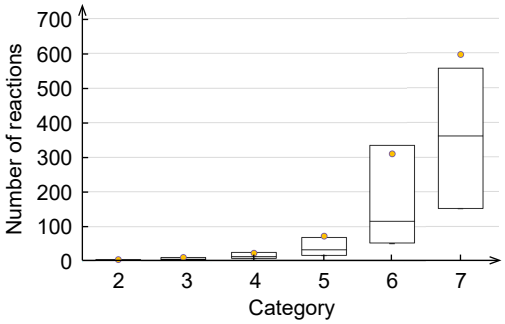

Fig. 7 Excluding maximum values, the reactions distribution over the categories.

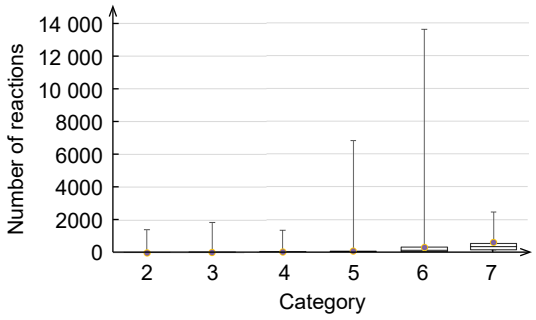

Fig. 8 Reactions distribution over the categories including maximum values.

posts that are "Kind" and "Joyful"; that is, those that make them happy. In Fig. 9, we visualize the reaction types distribution for every category. The first three categories have a large distance between joyful reaction types and the others. Subsequently, the categories become closer to each other.

A different behavior is noticed for the "Angry" reaction type, especially in the fifth to seventh categories: Starting from the third place in the fourth category, it becomes closer to "Love" and "Haha" in the fifth category, then becomes first in the sixth and seventh categories. Table 8 shows the order of all types in each category.

6 Results and Discussion of Mono-Reactors' Gender

We have defined users who tend to express only one reaction type, called mono-reactors. This category is special because 81% (2 581 986 from 3 173 537) of the sample fall under this axis, of which 45% are C2. Table 8 shows a quantitative distribution of all mono-reactors, the totality of their reactions, and the percentage of C2 for each reaction type. Being satisfied with a single reaction type, this user category comprises the majority in the database, a behavior that leads us to question the impact of gender on the production of a specific reaction type.

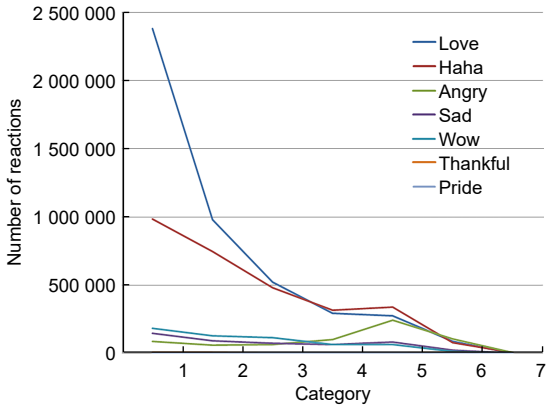

Fig. 9 Distribution of reaction types by categories.

6.1 Gender of top mono-reactors

After determining the gender of 81% of users, we illustrate the tendency of mono-reactors to have the maximum of released reactions in Fig. 10. Men's reactions are higher than women's. Among the 14 categories, 12 men use a maximum of reactions and are the first to express any emotion, such as "Love", "Haha", "Wow", "Angry", and "Pride". By contrast, two categories are represented by women: "Sad_C1" and "Thankful_C1". This result allows us to deduce that women are emotional and sensitive when it comes to sadness, which is justified by the distance between Sad_C1 (women = 57) and Sad_C2 (men = 14). Equality is observed in terms of recognition because the two genders are equal in the number of acknowledgments (Thankful_C1: women = 10; Thankful_C2: men = 11).

6.2 Mono-reactors sampling

These first statistics remain top views and a first

Table 7 Comparison of different Mono-reactor statistics by type.

Reaction type	Number of users	Number of reactions	Percentage of users in C2 (%)	Percentage of reactions in C2 (%)	Percentage of users with most reactions (>4 reactions) (%)
Love	1 545 020	2 382 402	45	35	1.94
Haha	657 801	982 187	43	35	1.52
Wow	167 215	184 461	49	47	0.53
Angry	72 972	86 319	40	39	1.10
Sad	135 553	147 145	43	41	0.44
Thankful	3078	3359	46	45	0.55
Pride	347	386	67	65	0.86
Total	2 581 986	3 786 259	44	36	1.64

Table 8 Reaction types sorted by category.

Category	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7
1, 2, and 3	Love	Haha	Wow	Sad	Angry	Thankful	Pride
4 and 5	Haha	Love	Angry	Sad	Wow	Thankful	Pride
6	Angry	Love	Haha	Sad	Wow	Thankful	Pride
7	Angry	Haha	Love	Sad	Wow	Thankful	Pride

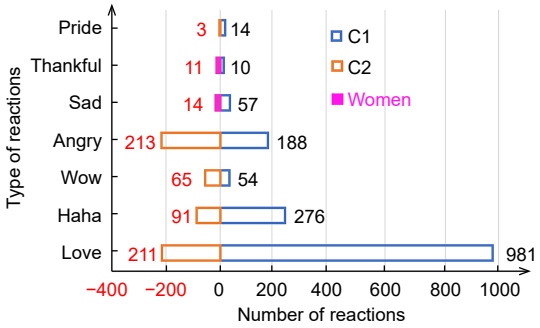

Fig. 10 Top mono-reactor reactions by type and gender.

interpretation of the effect of gender on the expression of reactions. To deepen our analysis, we carry out a stratified sampling[54–56] of the 14 classes of the different reaction types.

Sampling is carried out in respect of these points:

(1) Selection of the top 100 mono-reactors. (As shown in Fig. 11).

(2) If the selection remains below these 100 other users with the same number of reactions:

- **Scenario 1:** We increase the selection to include all of these users with the same number of reactions.
- **Scenario 2:** We reduce the selection to the high reaction number (if the selection reduction number is low).

Figure 12 explains the above two scenarios through examples. Table 9, ordered by the average column, displays the number of selections for C1 and C2 of each type, strata composition by gender, total reactions expressed by users of these strata, and the average of reactions.

We notice that the reaction types "Thankful_C1",

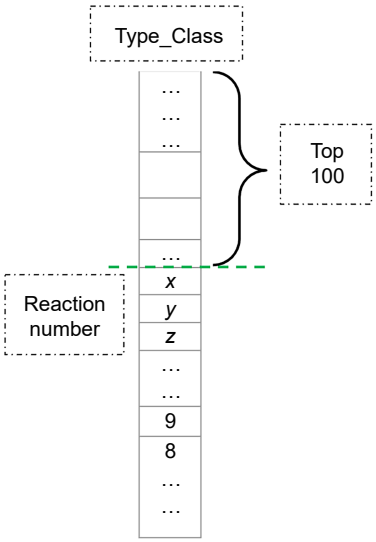

Fig. 11 Mono-reactors first sampling for gender study.

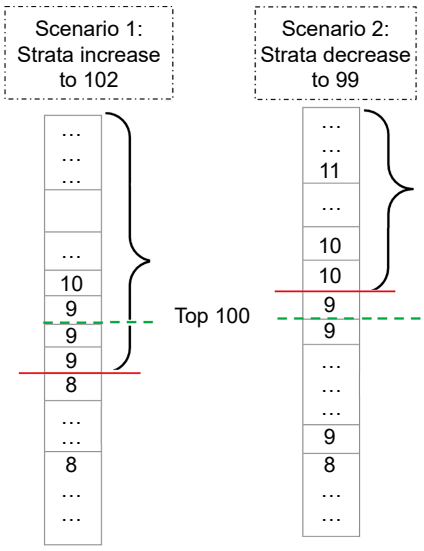

Fig. 12 Scenarios of mono-reactors sampling for gender study.

"Thankful_C2", "Pride_C1", and "Pride_C2" have a very low average (does not exceed 2). This non-representative rate can be justified by their occasional aspects. Therefore, we study the effect of their elimination from the study. Table 10 shows new statistics after eliminating users with low reactions, we notice that:

- Only the two classes of "Thankful" and "Pride" reaction types decrease in number. These classes do not include women except for "Thankful_C1", with two women out of 12 users.
- The total of reactions is slightly affected and decreases by 2%.
- The number of reactions expressed by one user (mean) increases from 24.29 to 32.55 reactions, this is due to the low elimination of reactions (2%) and a remarkable reduction in user number (27%) from 1699 to 1247.
- The number of men decreases by 30% and that of women by 21%.

After the elimination of users with low reactions, we visualize the new strata distribution. Figures 13 and 14 illustrate C1 and C2, respectively.

For C1, most of the mono-reactors are men, with the exception of the Sad type. The percentages of male mono-reactors for "Thankful" and "Pride" are 83% and 100%, respectively. The "Sad" reaction is expressed by 52% of women against 48% of men (*B* in Fig. 13). In addition, we notice that women distance themselves from anger and laughter. They are not very attracted to these emotions and do not express these reactions (*A* in

Table 9 Comparison of different mono-reactor statistics by type.

Type	Number of users	Number of men	Number of women	Number of reactions	Average
Love_C1	100	62	38	17 544	175.44
Haha_C1	104	74	30	7248	69.70
Love_C2	111	45	66	5112	46.05
Haha_C2	116	64	52	3154	27.19
Angry_C1	99	70	29	2214	22.36
Angry_C2	94	63	31	1345	14.31
Wow_C1	100	64	36	1129	11.29
Sad_C1	105	50	55	1150	10.95
Wow_C2	234	93	141	981	4.19
Sad_C2	164	82	82	614	3.74
Thankful_C1	117	69	48	263	**2.25**
Thankful_C2	86	49	37	189	**2.20**
Pride_C1	107	76	31	129	**1.20**
Pride_C2	162	124	38	177	**1.09**
Total	1699	985	714	41 249	24.28

Table 10 Strata after users with low reactions elimination (1 or 2 reactions).

Sample status	Number of users	Number of men	Number of women	Number of reactions	Mean (reactions/users)
Starting sample	1699	985	714	41 249	24.29
Sample after weak mono-reactors elimination	1247	685	562	40 591	32.55
Percent eliminated	27%	30%	21%	***2%***	8.26

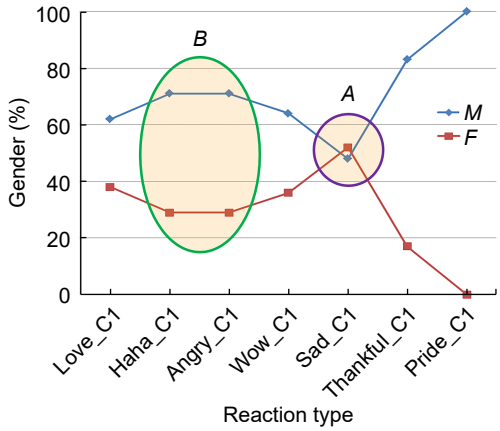

Fig. 13 Mono-reactors gender results in C1.

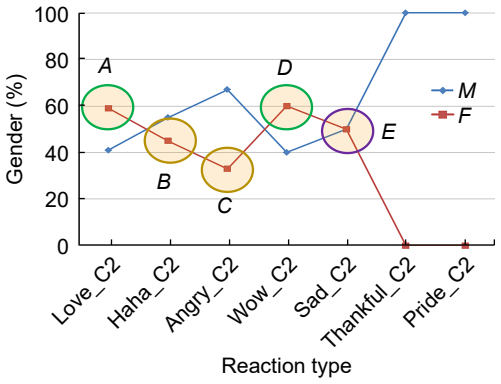

Fig. 14 Mono-reactors gender results in C2.

Fig. 13).

In Fig. 14, C2 can be divided into three sets:

● **Women set:** This includes the two types "Love_C2" and "Wow_C2". With approximately 60% and without "Like", women express love and surprise in their reactions. By contrast, men are a minority at 40% (*A* and *D* in Fig. 14).

● **Men set:** With a percentage of 67% and 55%, men tend to express anger and laughter, unlike women, who distance themselves from these two types. As this is the same behavior recorded in C1, we deduce that anger and laughter are possibly used by men (*B* and *C* in Fig. 14).

● Common set: with 50%, women and men share the feeling of sadness (*E* in Fig. 14). Although they may tend to hide this in real life, men see themselves as eligible and free to show it in the virtual world.

In summary, this study reveals two large results.

Result 1: The study, carried out on 9 million reactions and 3 million users, reveals the following

observations:

(1) Users tend to always use one and the same reaction type. In extreme cases, they do not exceed three reaction types. Those who react with all the reactions are rare (970 for 6 types and only 12 for 7 types).

(2) Users tend to interact with what is "Nice" and "Happy", that is, posts that make them happy.

(3) For both rare categories, "Anger" is first. Anger is a transient emotion on many levels, at times last, but other times in the middle, and finally first.

Result 2: Gender-based reaction profiling of the 2.5 million reactive mono-users (3.7 million reactions) reveals the following findings:

(1) Users tend to react toward publications, and few are interested in comments and sub-comments.

(2) Men are more reactive than women. Among 14 reaction types classified, 13 men are the first to express a large number of reactions.

(3) For C1:

- Women express sadness more than men.
- Men tend to express anger, laughter, and surprise.
- Women distance themselves from expressing anger and laughter.

(4) For C2:

- Women express love and surprise more than men.
- Anger and laughter are reactions only used by men.
- Both genders share feelings of sadness.

7 Conclusion

This study is one of the first to examine the gender effect on reactions expressed in a virtual world, such as Facebook, the well-known OSN. In this study, we discover the emotional behavior of users within the virtual world and the users' tendency to express one and the same reaction. In addition, in the majority of cases, users express joyful feelings about the content. For future work, we plan to complete the users' gender study for the other categories. The goal is to extend the characteristic vector via a content analysis (publications and comments text) and dynamism activities study (publications and comments creation time) to elaborate on users' profiling using artificial intelligence algorithms.

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