Interpretation of Mandarin Negation Construction "差点儿 (没 / 没有) "

Jing Ji

1 Introduction

In Contemporary Mandarin, the semantic category of negation tends to interact with other modal category. For example, the negative adverb "不" is used to express volition, while "没" is related to past tense, negating the occurrence of an event. Therefore, the following two sentences have opposite truth values.

(1) 我 吃 了 饭。(I had meals.)
(2) 我 没 吃 饭。(I didn't have meals.)

Different from negative adverb containing tense or modal meaning, some modal adverbs have implicit negative meaning, such as "差点儿", "差不多", "几乎". When added in sentences, they can change or reverse the truth value of a sentence just like negative adverb, as shown in the following sentences.

(3) 他 成功 了。(He succeeded.)
(4) 他 没 成功。(He didn't succeed.)
(5) 他 差点儿 成功 了。(He nearly succeeded.)

The meaning of sentence (5) is similar to that of sentence (4), indicating that if (3) is true, then (5) is false, vice versa. But (5) is not equal to (4) because the meaning of (4) is just the entailment of (5). That is to say, we can get the meaning of (4) from (5) by inference. The actual meaning of "差点儿 + VP" is the conjunction of presupposition and entailment, which are "close to VP" and "has not VP" respectively. However, whether a VP is close to be realized or not hinges on individual perspective.

When modal adverb of implicit negation occurs with negative adverb "没 / 没有" in a sentence, whether it is double negation or not depends on people's anticipation of the event "VP" expresses, resulting in asymmetry between form and meaning.

(6) 他 差点儿 成功。(not succeed)
(7) 他 差点儿 没 成功。(succeed)
(8) 他 差点儿 失败。(not fail)
(9) 他 差点儿 没 失败。(not fail)

If the event "VP" expresses is what the speaker anticipated, like (7), the implicit negation counteracts with negative adverb, emphasizing people's fortunate feeling that a good thing finally happened. Nevertheless, when the event is not anticipated by speaker, the implicit negative meaning in "差点儿" overflows to be realized as an expletive negation "没", resulting in a pair of synonymous structure "差点儿 + VP" and "差点儿 + 没 + VP". Both of them indicate optimistic circumstance of avoiding undesirable event. Consequently, the structure "差点儿 + (没) + VP" tends to express optimistic attitude.

Since the extra-linguistic force of anticipation is usually related to sentiment of a certain VP, positive or negative, it is expected that people tend to use negative VP in the structure and a neutral VP is always realized as a negative VP in a certain context, which is verified by corpus statistics.

2 Syntax and Semantics in Haskell

2.1 Data Construction

The well-formed sentences can be built by NP and VP, together with auxiliary word "了", negative adverb "没 / 没有" or "modal adverb". Modal adverb can be used with auxiliary word or negative adverb, whereas negative adverb "没" can not occur with "了". But for sentence with expletive negation "没", their co-occurrence is allowed.

In order to represent well-formed sentences, firstly, a set of new data types is defined. "AU" stands for auxiliary words "了", "NG" representing "没 / 没有", "MD" for modal adverb "差点儿". In addition to VP, VP' consists of VP and auxiliary word. Since "了" occurs between transitive verb and object, we cannot build VP' directly from VP. NGVP is made up of NG and VP. MVP can be realized as MD + VP/VP', MD + NGVP or MD + NG + VP'. For the last formula MD + NG + VP', we can tell from the structure that NG is expletive and VP' must have negative sentiment. Example sentences are shown below.

```
s1 = SM (PRN "他" 1) (MNG (MD "差点儿") (NGVP (NG "没") (IVP (IV "结婚"))))
```
He nearly failed to get married.
```
s2 = SN (NP (N "Ayla")) (NGVP (NG "没") (TVP (TV "撞到") (NP (N "Suji"))))
```
Ayla didn't run into Suji.
```
s3 = SM (NP (N "Yang")) (MNG' (MD "差点儿") (NG "没") (IVP' (IV "摔倒") (AU "了")))
```
Yang nearly fell down.
```
s4 = S (PRN "我" 4) (TVP' (TV "得") (AU "了") (NP (N "100分")))
```
I obtained 100 points.
```
s5 = SM (PRN "我" 4) (MVP' (MD "差点儿") (TVP' (TV "得") (AU "了") (NP (N "100分"))))
```
I nearly obtained 100 points.
```
s6 = SM (NP (N "Yang")) (MVP (MD "差点儿") (IVP (IV "摔倒")))
```
Yang nearly fell down.

2.2 Entity and Function Models

The data type entity is defined as a series of data constructors that support equality testing. The main verb in the sentence acts as a function that takes entity as arguments and returns truth values. Difference between transitive and intransitive lies in the number of arguments. Whereas the function of intransitive verbs checks whether a given entity is element of a list, the transitive verb function checks the identity of a tuple of entities. Examples are listed below.

```
data Entity = M | NZ | Y | A | SJ | J | N1 | N2 | N3 deriving (Show,Eq)
nazila, jing, point80 : : Entity
nazila = NZ
```

```
jing = J
point80 = N2

marry : : Entity -> Bool
marry = \x -> elem x [NZ]

obtain : : Entity -> Entity -> Bool
obtain = \y -> \x -> elem (x,y) [(J,N2)]
```

2.3 Variable Assignment

The variable assignment function is used to deal with pronouns which takes a number and assigns an entity to it. Different numbers refer to different entities in a certain context. The domain of variable assignment includes any evaluation module.

2.4 Process of Interpretation

Sentence interpretation consists of three interactive parts, sentiment evaluation, probability evaluation and interpretation rules. Specifically, basic interpretation rules evaluate the truth value of sentence without "差点儿"; probability evaluation represents presupposition of the event and sentiment evaluation reveals sentiment of VP.

2.4.1 Sentiment Evaluation

Sentiment function takes VP or VP' and assigns positive or negative values according to the anticipation of a speaker. Since VP and VP' only differ in auxiliary word which does not affect sentiment, the sentiment evaluation of VP' is the same as VP without auxiliary word. Examples are shown as follows.

```
sentimentVP :: VP -> (Int -> Entity) -> Sentiment
sentimentVP (IVP (IV "结婚")) g = Positive
sentimentVP (TVP (TV "撞到") _) g = Negative

sentimentVP' :: VP' -> (Int -> Entity) -> Sentiment
sentimentVP' (IVP' iv au) g = sentimentVP (IVP iv) g
sentimentVP' (TVP' tv au np) g = sentimentVP (TVP tv np) g
```

2.4.2 Probability Evaluation

Probability evaluation is used to express the expectation of the speaker about the probability of the occurrence of an event, accounting for the presupposition of sentence with "差点儿". It takes an sentence and returns a number in the range 0 through 100. In MVP construction of "MD + NGVP", whether the negation in NGVP is expletive or not has an impact on the target of evaluation. If sentiment of VP is negative, then the sentence without NG, which is NP + MD + VP, should be evaluated, otherwise the probability of NP + NG + VP should be target of evaluation. Examples are listed below.

```
probabilityS :: S -> (Int -> Entity) -> Int
probabilityS (S (NP (N "Michael")) (IVP' (IV "结婚") (AU "了"))) g = 90
```

probabilityS (S (NP (N "Yang")) (IVP' (IV "摔倒") (AU "了"))) g = 95

probabilityS (SN (NP (N "Michael")) (NGVP (NG "没") (IVP (IV "结婚")))) g = 10

probabilityS (SM np (MVP' md vp')) g = probabilityS (S np vp') g
probabilityS (SM np (MVP md (IVP iv))) g = probabilityS (S np (IVP' iv (AU "了"))) g
probabilityS (SM np (MVP md (TVP tv n))) g = probabilityS (S np (TVP' tv (AU "了") n)) g
probabilityS (SM np (MNG md (NGVP ng vp))) g = if sentimentVP vp g == Negative
    then probabilityS (SM np (MVP md vp)) g
    else probabilityS (SN np (NGVP ng vp)) g
probabilityS (SM np (MNG' md ng vp')) g = probabilityS (S np vp') g

2.4.3 Process of Interpretation
The logic of interpretation of a given sentence is shown by the following pseudo code.
For sentences without "差点儿" :
    basic interpretation rules
For sentences with "差点儿" :
    If probability evaluation >= 90:
        If there is no NG:
            opposite value of sentence without "差点儿"
        Else:
            If sentiment of VP is negative:
                opposite value of sentence without "差点儿+没" (expletive negation)
            Else:
                same value of sentence without "差点儿+没" (double negation)
    Else:
        Return False

3 Tests with Examples of "差点儿+(没)+VP"

Assume that a speaker attended a math exam yesterday and obtained 80 points because he carelessly made a mistake in one question which accounts for 20 points. He could have got 100 points if he found the mistake during the exam. Though he didn't, he fortunately found a mistake of another question which is also 20 points before handing in the test paper, avoiding the risk of getting only 60 points. In this context, there are three possible events and only obtaining 100 points is positive in sentiment.

sentimentVP (TVP (TV "得") (NP (N "60分"))) g = Negative
sentimentVP (TVP (TV "得") (NP (N "100分"))) g = Positive
sentimentVP (TVP (TV "得") (NP (N "80分"))) g = Negative

Although the speaker finally got 80 points, the probability of obtaining 100 points and 60 points are also very high, which is shown in the probability evaluation.

probabilityS (S (PRN "我" 4) (TVP' (TV "得") (AU "了") (NP (N "60分")))) g = 98

probabilityS (S (PRN "我" 4) (TVP' (TV "得") (AU "了") (NP (N "80分")))) g = 100
probabilityS (S (PRN "我" 4) (TVP' (TV "得") (AU "了") (NP (N "100分")))) g = 95

Based on our interpretation logic, we can test the truth value of the following sentences in Haskell. All of them should be true except s8. The results are copied and pasted below.

s7 = SM (PRN "我" 4) (MVP' (MD "差点儿") (TVP' (TV "得") (AU "了") (NP (N "100分"))))
s8 = SM (PRN "我" 4) (MVP' (MD "差点儿") (TVP' (TV "得") (AU "了") (NP (N "80分"))))
s9 = SM (PRN "我" 4) (MVP' (MD "差点儿") (TVP' (TV "得") (AU "了") (NP (N "60分"))))
s10 = SM (PRN "我" 4) (MNG' (MD "差点儿") (NG "没") (TVP' (TV "得") (AU "了") (NP (N "60分
"))))

*Main> intS s7 g
True
*Main> intS s8 g
False
*Main> intS s9 g
True
*Main> intS s10 g
True