The prize of the barrel of Brent oil drops down to 12.17$

1) CFG

S --> NP VP
NP --> det noun
NP --> propernoun
NP --> quantity unit
NP --> NP PP
NP --> NP PP noun
PP --> Preposition NP
VP --> verb NP

det --> the
preposition --> of | to
noun --> prize | barrel | oil
propernoun --> Brent
verb --> drops down
quantity --> 12.17
unit -->$

2) DCG

S([head:[number:Y]]) --> NP([head:[number:Y]]) VP([head:[number:Y]])
NP([head:[number:Y]]) --> det noun([number:Y])
NP([head:[number:Y]]) --> propernoun([number:Y])
NP([head:[number:Y]]) --> quantity unit
NP([head:[number:Y]]) --> NP([head:[number:Y]]) PP
NP([head:[number:Y]]) --> NP([head:[number:Y]]) PP noun([number:Y])
PP --> Preposition NP([head:[number:Y]])
VP([head:[number:Y]]) --> verb([number:Y]) NP

Terminal entries
terminal(det, the).
terminal(preposition, of).
terminal(preposition, to).
terminal(noun([number:singular]), prize).
terminal(noun([number:singular]), barrel).
terminal(noun([number:singular]), oil).
terminal(propernoun([number:singular]), Brent).
terminal(verb([number:singular]), drops_down).
terminal(unit, $).
terminal(quantity,N):- quantity(N).

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DCG_02

Several hundreds
Less than one thousand
About 15,000
Around five hundreds
Two or three dozens
327
Between two and three hundred

1. Propose a representation formalism for quantities like the ones in these examples.
   
   (type of value, value)
   (exact_quantity, quantity) // (exact_quantity, 327)
   (modified_value,(modifier, quantity)) // (modified_value,(several, hundreds)),
   (modified_value,(less-than, 1000)),(modified_value,(about, 15,000))
   (modified_value,(around, 500))
   (values_related, (relation,value1,value2)) // (values_related,(or,24 ,36)),
   (values_related,(between,200,300))

2. DCG

   numerical (sem:(exact_quantity,N)):- number (N).
   numerical(sem:[Semantic,N]):- modifier(Semantic), number(N).
   numerical(sem:[between,[Val1*Val,Val2*Val]]):-
   between, digit(Val1),and,digit(Val2), textexpression(Val).
   numerical(sem:[or,[Val1*Val,Val2*Val]]):-
   digit(Val1),or,digit(Val2), textexpression(Val).

   number(N):- integer (N).
   number(Val1*Val):- digit(Val1), textexpression(Val).
   number(N):- textexpression(N).

   terminal(digit(1),one).
   terminal(digit(2),two).
   terminal(digit(3),three).

   terminal(modifier(around),around).
   terminal(modified(about),about).
   terminal(modified(several), about).

   terminal(textexpression(12),dozen).
   terminal(textexpression(12),dozens).
   terminal(textexpression(100),hundred).
   terminal(textexpression(100),hundreds).
   terminal(textexpression(1000),thousand).
   terminal(textexpression(1000),thousands).

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DCG_03

11th September 2006
The day before yesterday
Last Saturday
Christmas day
In Winter
In middle of July

1. Propose a representation formalism for dates and time intervals like the ones in these examples.
   (type_date, date)
   (longdate, (day,month,year))
   (spetial_day, name-day)
   (weekday, weekday)
   (modified specialday, (modifierdate, name-day)) //last Christmas
   (modified weekday, (modifierdate, weekday)) // last Friday
   (intervals, season)
   (intervalm, month)
   (modified, season)
   (modified, month) | (middle, July)

2) Using the DCG formalism write a simple grammar for detecting in a sentence temporal expressions like these and representing them according to the representation system proposed in 1).

```
date -> longdate
date -> relativeday
date -> textdate
date -> modifierdate textdate
date -> in interval
longdate -> day month year
textdate -> weekday
textdate -> specialday

interval -> period
interval -> modifierinterval period
period -> month
period -> season

relativeday -> today | tomorrow | yesterday | the day after tomorrow | the day before tomorrow
specialday -> Christmas day | Thanksgiving day
weekday -> Monday| Tuesday| Wednesday| Thursday| Friday | Saturday | Sunday
modifierdate -> this | last | next
month -> January| February
season -> Autumn| Winter
modifierinterval -> middle of| the end of
```

Propose a way of normalizing these temporal expressions.
Several examples
(d, day, month, year)
longdate (day,month, year) -- normalized(day, month, year)
relativeday (sem(Val))– actualdate (Date), Add( Date,Val,normalized(FinalDate))
|tomorrow(sem(1)), yesterday(sem(-1))
specialday (day,month, year) -- normalized(day, month, year)
modifierdate(M) weekday() -- actualdate (Date),
if ((Mod == this or Mod == next) && daynumber(weekdate) > daynumber (Date)) {
    finaldaynumber = daynumber(weekdate) - daynumber (actualdate);
    if (Mod == next) {finaldaynumber = finaldaynumber + 7;
        actualizemonth(Date, finaldaynumber) } }