

Hoxell-enabled Personalization: Berna Hotel

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Introduction

This is the current report for the persalization study of *HGRM* use at the *Berna Hotel*. The report was generated on 16 April, 2016.

Basic statistics

The dataset includes **105087** reservations for **108245** hotel stays during the **01 January, 2010** to **03 July, 2015** timeframe. Of these, **14658** are personalized either physically or through myPage.

Personalization Request via Traditional Channel and myPage

```
##
##
##          mean          sd      min      max
## -----
## Stays      1640.08      232.09      808      2167
## physical    35.03       19.27         2       100
## virtual    232.28       60.06      102       374
## physical     1.06        0.26         1         4
## virtual     5.99         3.30         1        32
```

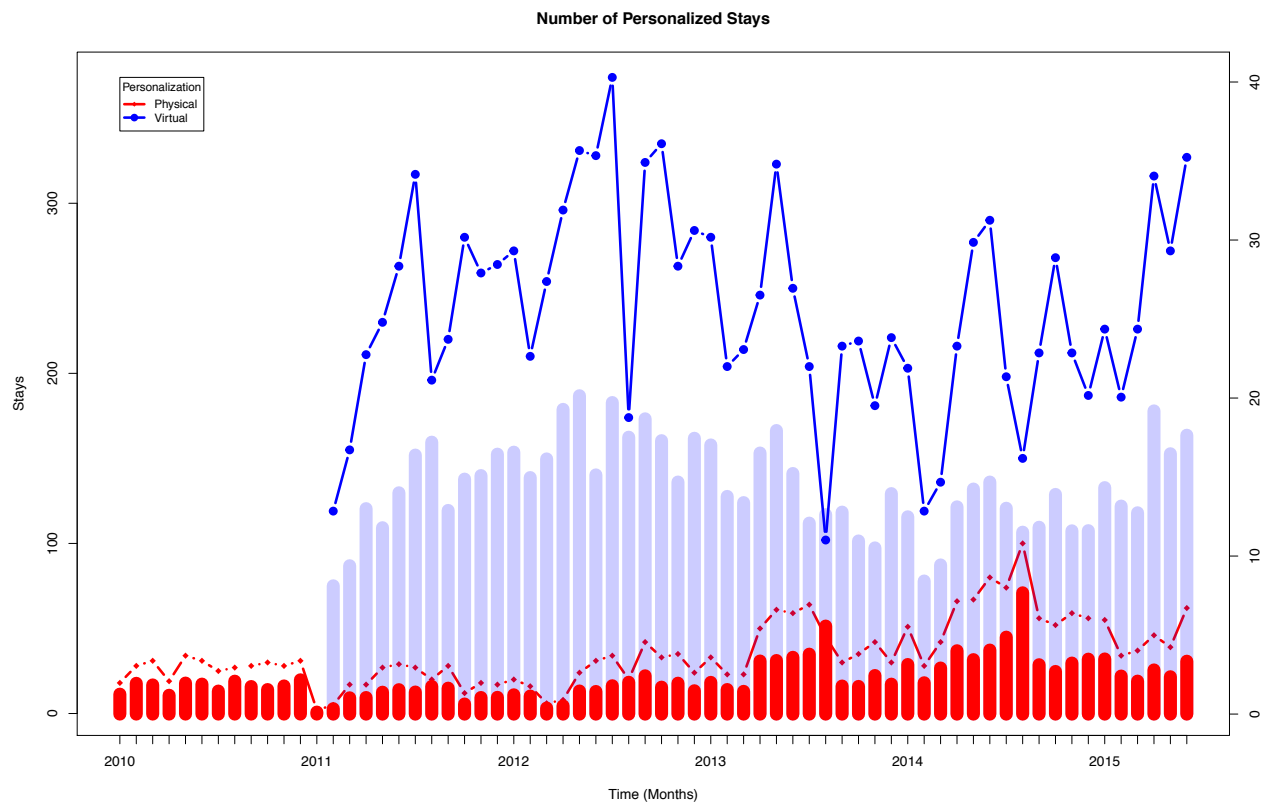
The effect of Hoxell on preference elicitation: Customers

Our analysis shows that the introduction of Hoxell has a significant impact on the number of guests who personalize their stay at Berna Hotel. It also indicates that the introduction of personalization features in Hoxell has a positive effect on personalization via the tradition (physical) method.

Poisson and Binomial Regression Results

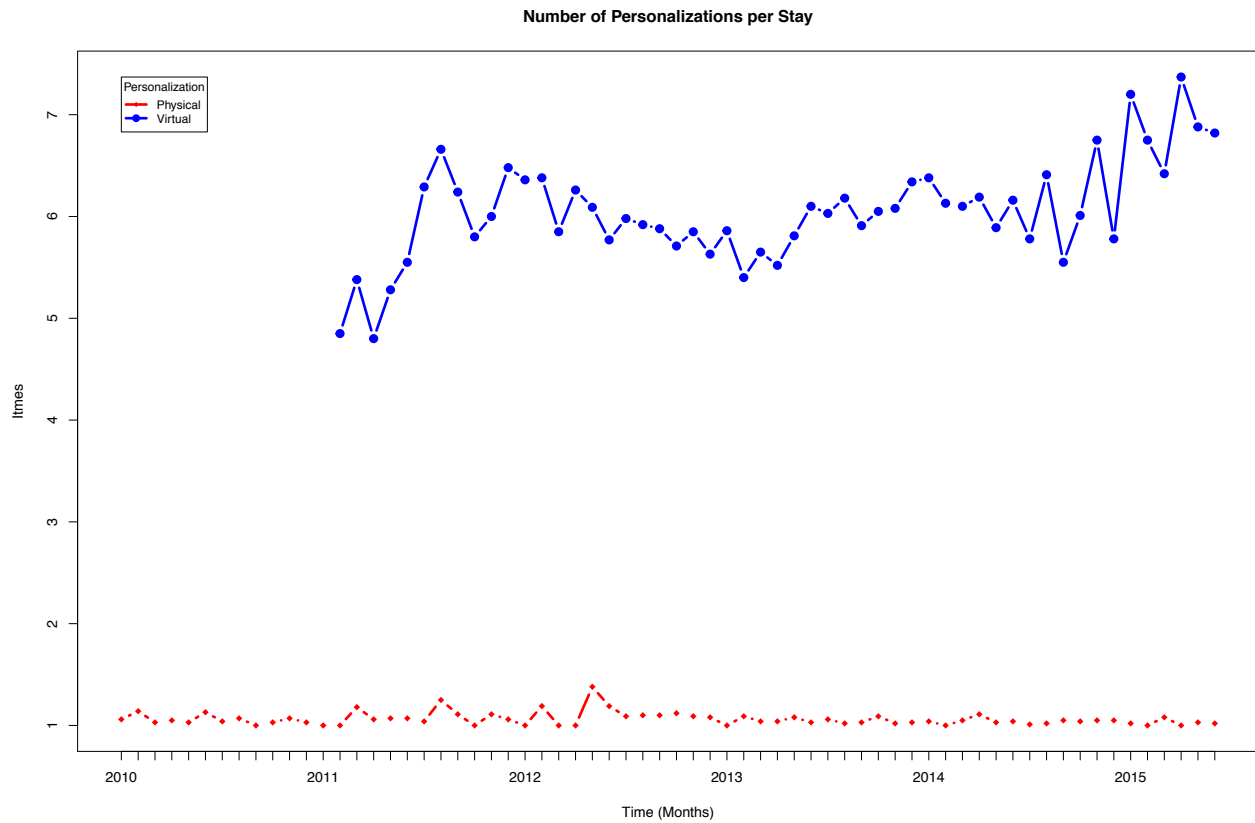
```
##
##
##
```

	Estimate	Std. Error	z value	Pr(> z)	
## -----	-----	-----	-----	-----	-----
## (Intercept)	0.06	0.02	2.77	0.01	NA
## Methodvirtual	1.73	0.02	84.99	0.00	NA
## (Intercept)	-4.11	0.06	-74.37	0.00	0.02
## methodvirtual	1.97	0.02	80.38	0.00	7.18
## virtualizationTRUE	0.36	0.06	6.08	0.00	1.44



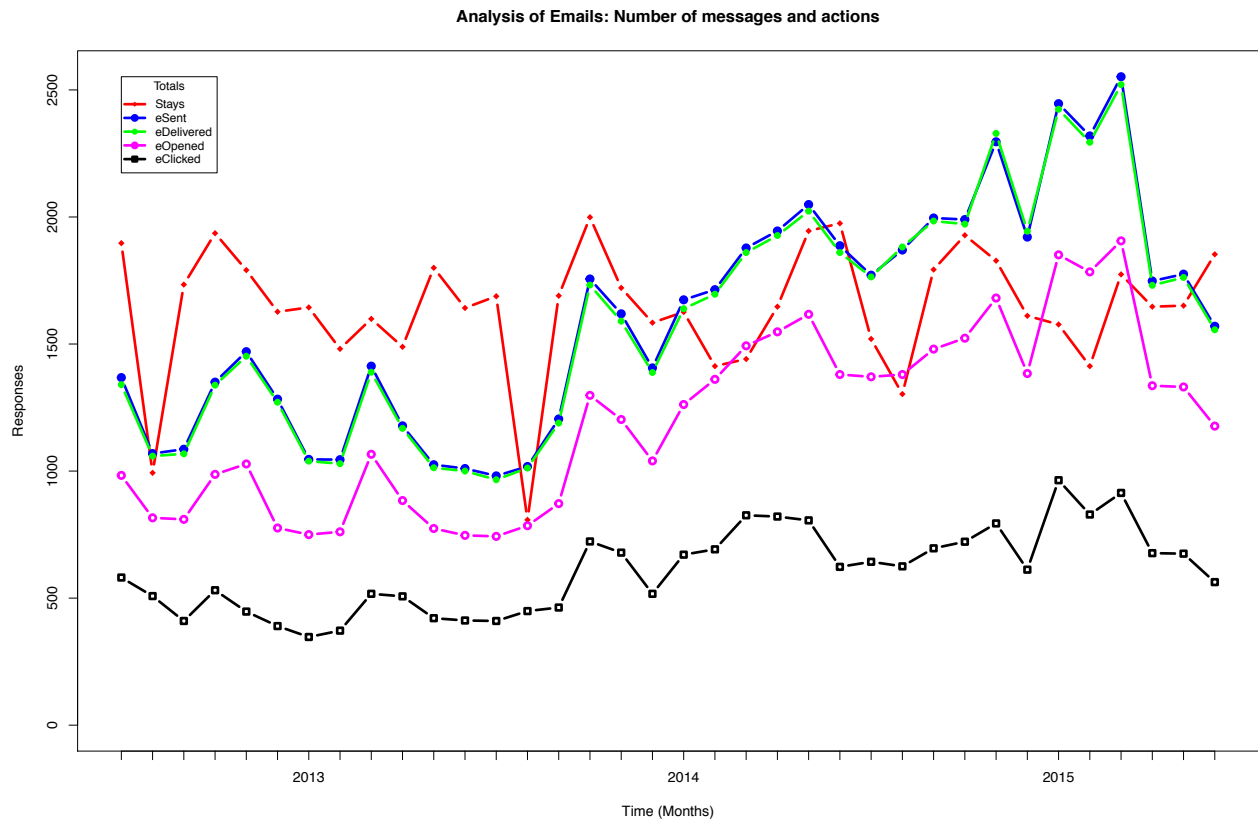
The effect of Hoxell on preference elicitation: Personalizations

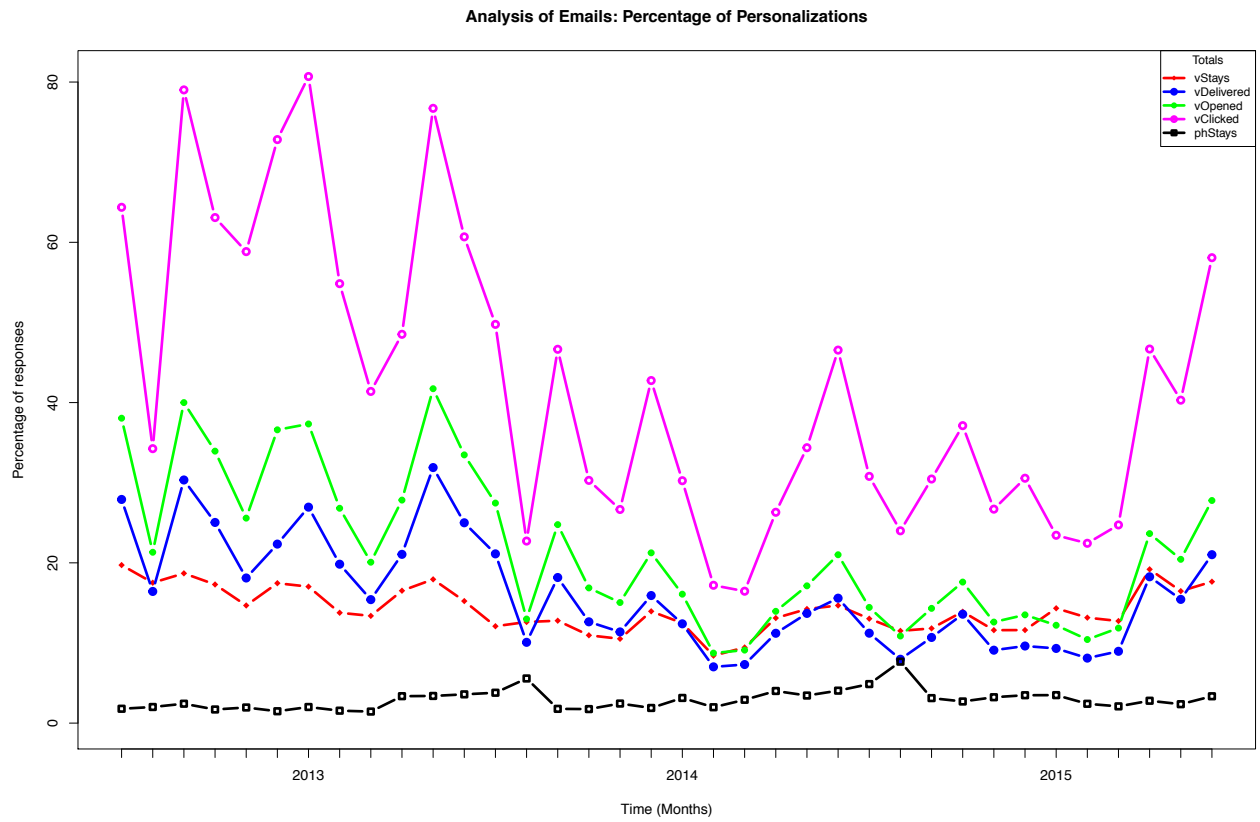
This analysis focuses on the number of items requested by customers who personalize. We find a strong impact of Hoxell on the number of items requested by customers. Specifically when personalizing through traditional means customers chose an average of 1.06 items. Conversely, when using Hoxell they select 5.99 items.



Analysis of emails

This section provides a monthly analysis of emails sent via the Mandrill application.





The Effect of Personalization on Service and Value Hotel Ratings

We test the effect of personalizations on hotel service and value ratings using 5406 reviews posted to Booking.com merged with reservation data.

Personalization Effect on Service

```
##
##
##
```

	Estimate	Std. Error	z value	Pr(> z)	
## 2.5 5	-4.45	0.22	-19.88	0.00	NA
## 5 7.5	-2.42	0.17	-14.64	0.00	NA
## 7.5 10	0.07	0.16	0.45	0.65	NA
## Personalization	0.18	0.07	2.63	0.01	1.19
## ADR	-0.18	0.03	-5.42	0.00	0.83
## LoS	0.02	0.02	0.94	0.35	1.02
## ROOM_TYPEQUALITY	0.19	0.09	2.18	0.03	1.21
## ROOM_TYPESUPERIOR	0.34	0.10	3.25	0.00	1.40
## ROOM_TYPESINGOLA (BASIC)	-0.03	0.10	-0.27	0.78	0.97
## ADULTS	0.20	0.08	2.57	0.01	1.22
## CHILDREN	0.17	0.11	1.49	0.14	1.18
## PrefPrice	-0.01	0.01	-0.65	0.51	0.99

Personalization Effect on Value

```
##
##
##
```

	Estimate	Std. Error	z value	Pr(> z)	
## 2.5 5	-3.43	0.18	-19.11	0.00	NA
## 5 7.5	-1.60	0.15	-10.42	0.00	NA
## 7.5 10	0.58	0.15	3.83	0.00	NA
## Personalization	0.18	0.06	2.78	0.00	1.19
## ADR	-0.38	0.03	-11.40	0.00	0.68
## LoS	-0.04	0.02	-1.80	0.07	0.96
## ROOM_TYPEQUALITY	0.25	0.08	3.04	0.00	1.28
## ROOM_TYPESUPERIOR	0.35	0.10	3.60	0.00	1.43
## ROOM_TYPESINGOLA (BASIC)	0.10	0.09	1.02	0.31	1.10
## ADULTS	0.34	0.08	4.48	0.00	1.40
## CHILDREN	0.02	0.11	0.15	0.88	1.02
## PrefPrice	0.00	0.01	-0.50	0.61	1.00

The Effect of Number of Personalization on Service

##	Estimate	Std. Error	z value	Pr(> z)	
## -----	-----	-----	-----	-----	-----
## 2.5 5	-4.36	0.49	-8.96	0.00	NA
## 5 7.5	-2.42	0.36	-6.68	0.00	NA
## 7.5 10	0.20	0.34	0.57	0.57	NA
## Count.of.Personalization.Items.Used	0.03	0.02	1.90	0.06	1.03
## ADR	-0.14	0.07	-1.87	0.06	0.87
## LoS	0.00	0.04	0.06	0.96	1.00
## ROOM_TYPEQUALITY	0.01	0.16	0.07	0.94	1.01
## ROOM_TYPESUPERIOR	0.28	0.21	1.34	0.18	1.32
## ROOM_TYPESINGOLA (BASIC)	0.28	0.21	1.36	0.18	1.33
## ADULTS	0.26	0.17	1.55	0.12	1.29
## CHILDREN	0.69	0.30	2.26	0.02	1.99
## PrefPrice	-0.01	0.01	-1.00	0.32	0.99

The Effect of Number of Personalization on Value

##	Estimate	Std. Error	z value	Pr(> z)	
## -----	-----	-----	-----	-----	-----
## 2.5 5	-3.92	0.42	-9.26	0.00	NA
## 5 7.5	-1.81	0.34	-5.38	0.00	NA
## 7.5 10	0.54	0.33	1.65	0.10	NA
## Count.of.Personalization.Items.Used	0.02	0.02	0.95	0.34	1.02
## ADR	-0.34	0.07	-4.53	0.00	0.72
## LoS	-0.08	0.04	-1.97	0.05	0.92
## ROOM_TYPEQUALITY	0.20	0.16	1.25	0.21	1.22
## ROOM_TYPESUPERIOR	0.29	0.20	1.48	0.14	1.34
## ROOM_TYPESINGOLA (BASIC)	0.23	0.20	1.13	0.26	1.26
## ADULTS	0.39	0.16	2.50	0.01	1.48
## CHILDREN	0.26	0.24	1.06	0.29	1.29
## PrefPrice	-0.01	0.01	-0.62	0.53	0.99

Hoxell Impact on Positive Share-Shift

This analysis focuses on the effect of personalization on the creation of a direct relationship with the customers that leads to share-shift from intermediated (high-cost) to direct (low-cost) distribution channels.

The analysis is based on a sample of 8393 reservations by guests who visited the hotel more than once during the timeframe of our analysis. Of these returning customers 1535 engaged in personalization during their first visit to the Berna Hotel.

Beneficial Share-Shift

```
##
##
##              Estimate   Std. Error   z value   Pr(>|z|)   Odds.Ratio
## -----
## (Intercept)          -1.300         0.196    -6.617     0.000      0.273
## I(Method.0 == "Virtual")TRUE      0.250         0.106     2.361     0.018      1.284
## ADR.1                  0.015         0.049     0.299     0.765      1.015
## ROOM_TYPE.1QUALITY      0.504         0.142     3.547     0.000      1.655
## ROOM_TYPE.1SUPERIOR     0.416         0.143     2.906     0.004      1.515
## ROOM_TYPE.1SINGOLA (BASIC)  0.117         0.124     0.944     0.345      1.125
## ADULTS.1              -0.379         0.108    -3.512     0.000      0.684
## CHILDREN.1            -0.255         0.200    -1.276     0.202      0.775
##
## [1] 0.1774295
```

Detrimental Share-Shift

```
##
##
##              Estimate   Std. Error   z value   Pr(>|z|)   Odds.Ratio
## -----
## (Intercept)          -1.103         0.279    -3.947     0.000      0.332
## I(Method.0 == "Virtual")TRUE     -0.566         0.146    -3.865     0.000      0.568
## ADR.1                  0.145         0.069     2.105     0.035      1.156
## ROOM_TYPE.1QUALITY     -0.642         0.236    -2.720     0.007      0.526
## ROOM_TYPE.1SUPERIOR    -0.607         0.200    -3.037     0.002      0.545
## ROOM_TYPE.1SINGOLA (BASIC)  0.420         0.172     2.443     0.015      1.522
## ADULTS.1              -0.018         0.161    -0.110     0.913      0.982
## CHILDREN.1             0.161         0.248     0.648     0.517      1.174
##
## [1] -0.4137348
```


Hoxell Impact on Positive Share-Shift - Limited window

This analysis focuses on the effect of personalization on the creation of a direct relationship with the customers that leads to share-shift from intermediated (high-cost) to direct (low-cost) distribution channels. Unlike the previous analysis we only use a portion of the data constraining only to people who return to the property within a limited window of days

The analysis is based on a sample of 3177 reservations by guests who visited the hotel more than once during the timeframe of our analysis. However we limit the analysis to only guests who returned withing **365** days. Of these returning customers 406 engaged in personalization during their first visit to the Berna Hotel. This analysis is performed by focusing only on those second stays that were booked after departure of the first stay. In other words, we eliminated instances where the second reservation was made before the first stay as the guest would have booked before enjoying the benefits of personalization.

Beneficial Share-Shift

```
##
##
##              Estimate      Std. Error    z value    Pr(>|z|)    Odds.Ratio
## -----
## (Intercept)          -0.821         0.266      -3.080      0.002      0.440
## I(Method.0 == "Virtual")TRUE      0.624         0.161       3.872      0.000      1.867
## ADR.1                -0.131         0.077      -1.692      0.091      0.878
## ROOM_TYPE.1QUALITY      0.271         0.229       1.187      0.235      1.312
## ROOM_TYPE.1SUPERIOR     0.315         0.221       1.427      0.154      1.370
## ROOM_TYPE.1SINGOLA (BASIC) -0.117         0.164      -0.713      0.476      0.889
## ADULTS.1              -0.156         0.158      -0.983      0.326      0.856
## CHILDREN.1            -0.228         0.301      -0.757      0.449      0.796
##
## [1] 0.5114278
```

Detrimental Share-Shift

```
##
##
##              Estimate      Std. Error    z value    Pr(>|z|)    Odds.Ratio
## -----
## (Intercept)          -1.537         0.421      -3.655      0.000      0.215
## I(Method.0 == "Virtual")TRUE     -0.431         0.259      -1.661      0.097      0.650
## ADR.1                 0.255         0.111       2.294      0.022      1.291
## ROOM_TYPE.1QUALITY    -0.568         0.445      -1.277      0.201      0.567
## ROOM_TYPE.1SUPERIOR   -0.266         0.327      -0.812      0.417      0.767
## ROOM_TYPE.1SINGOLA (BASIC)  0.719         0.256       2.813      0.005      2.053
## ADULTS.1              0.176         0.265       0.663      0.507      1.192
## CHILDREN.1           0.477         0.409       1.167      0.243      1.612
##
## [1] -0.321081
```

The analysis is based on a sample of 2062 reservations by guests who visited the hotel more than once during the timeframe of our analysis. However we limit the analysis to only guests who returned withing **183** days. Of these returning customers 230 engaged in personalization during their first visit to the Berna Hotel. This analysis is performed by focusing only on those second stays that were booked after departure of the first

stay. In other words, we eliminated instances where the second reservation was made before the first stay as the guest would have booked before enjoying the benefits of personalization.

Beneficial Share-Shift

```
##
##
##              Estimate   Std. Error   z value   Pr(>|z|)   Odds.Ratio
## -----
## (Intercept)          -0.822         0.314    -2.623     0.009     0.439
## I(Method.0 == "Virtual")TRUE      0.597         0.213     2.809     0.005     1.817
## ADR.1                 -0.086         0.100    -0.863     0.388     0.918
## ROOM_TYPE.1QUALITY       0.354         0.305     1.161     0.245     1.425
## ROOM_TYPE.1SUPERIOR      0.350         0.264     1.326     0.185     1.419
## ROOM_TYPE.1SINGOLA (BASIC) -0.075         0.195    -0.385     0.700     0.928
## ADULTS.1               -0.054         0.191    -0.283     0.777     0.947
## CHILDREN.1             -0.451         0.405    -1.111     0.266     0.637
##
## [1] 0.4721187
```

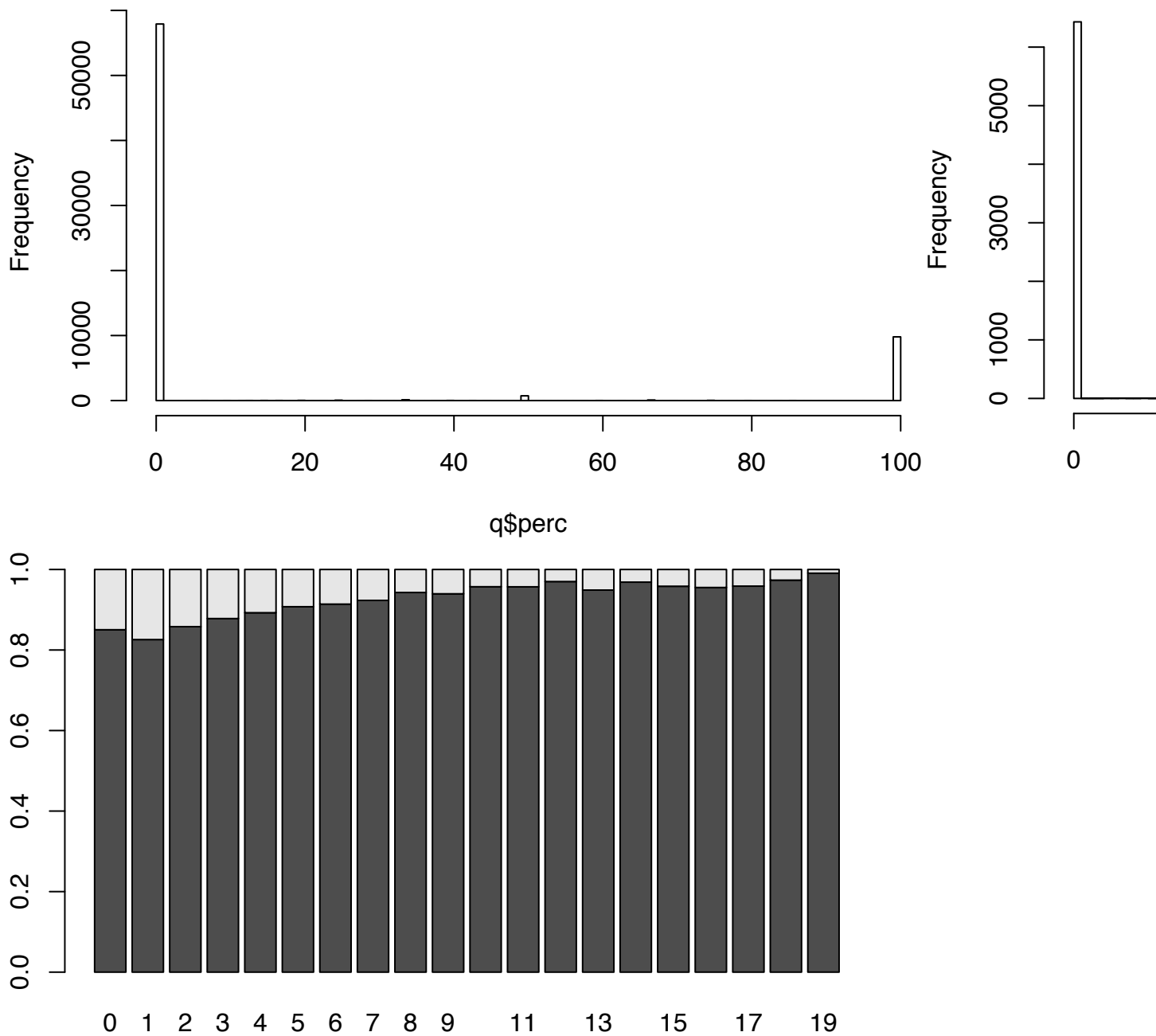
Detrimental Share-Shift

```
##
##
##              Estimate   Std. Error   z value   Pr(>|z|)   Odds.Ratio
## -----
## (Intercept)          -2.243         0.655    -3.425     0.001     0.106
## I(Method.0 == "Virtual")TRUE     -0.885         0.455    -1.945     0.052     0.413
## ADR.1                 0.317         0.176     1.803     0.071     1.373
## ROOM_TYPE.1QUALITY     -0.095         0.647    -0.146     0.884     0.910
## ROOM_TYPE.1SUPERIOR    -0.070         0.456    -0.154     0.877     0.932
## ROOM_TYPE.1SINGOLA (BASIC)  0.859         0.400     2.149     0.032     2.361
## ADULTS.1               0.394         0.401     0.983     0.326     1.482
## CHILDREN.1             0.469         0.565     0.830     0.407     1.598
##
## [1] -0.5576037
```

Extra analysis of personalization by number of stays

The first histogram shows how the overwhelming majority of guests does not personalize their stay, or always personalizes the stay. A few guests personalize some of the times with the only notable group being the 50%. The second chart shows the proportion of guests that personalize for each group returning between zero and 20 times to the property.

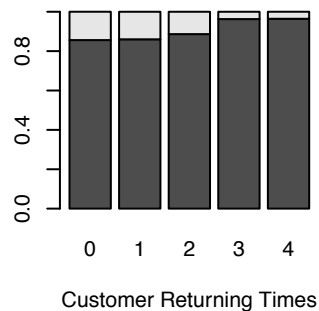
Percentage of personalization



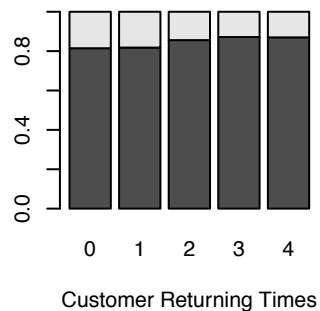
These are the proportion of personalization by year for those returning zero to four times at Berna.

```
## Personalization in 2011
##      0      1      2      3      4
##  0 11881 1973 1210 337 189
##  1  1998  321  155  13   7
## Personalization in 2012
##      0      1      2      3      4
##  0 11362 1802 1680 489 214
##  1  2585  401  283  72  32
## Personalization in 2013
##      0      1      2      3      4
##  0 10935 1494 1716 616 359
##  1  1930  265  225  75  45
## Personalization in 2014
##      0      1      2      3      4
##  0 11632 1285 1799 693 366
##  1  1847  195  197  73  34
## Personalization in 2015
##      0      1      2      3      4
##  0  5670  378  796  328 193
##  1   701  279  332  109  41
```

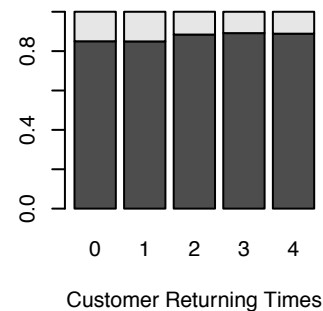
Personalization in 2011



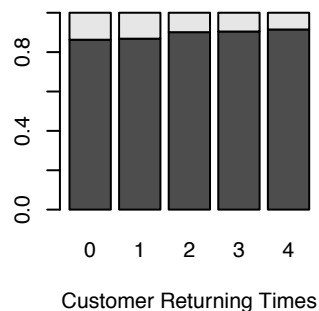
Personalization in 2012



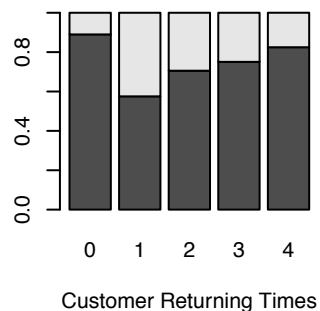
Personalization in 2013



Personalization in 2014



Personalization in 2015



The following analysis shows the extent of personalization by booking channel. Berna is most successful in stimulating personalizations via the website. Given the value of personalization, Berna should be much more proactive in stimulating personalization - particularly from guests who book directly with the hotel.

```
##          BOOKING_CHANNEL
## Personalization      internet  gds bookings europe b.v. expedia
##          0  7174      3794  1243                27299  12195
##          1   262      365   16                5360    817
##          BOOKING_CHANNEL
## Personalization home page hotel berna milano
##          0      13996                4762
##          1       5208                302

##          BOOKING_CHANNEL
## Personalization      internet  gds bookings europe b.v. expedia home page
##          0  0.96      0.91  0.99                0.84    0.94    0.73
##          1  0.04      0.09  0.01                0.16    0.06    0.27
##          BOOKING_CHANNEL
## Personalization hotel berna milano
##          0                0.94
##          1                0.06
```

Extra analysis of Traces and Personaization Items

Analysis of Traces - Items Requested through Physical Personalization

This analysis is performed on 2072 reservations with traces that express personalization items. The list of items, ordered by highest percentage of requests is:

```
round(cumsum(sort(prop.table(rez), decreasing = TRUE)), 3)
```

##	Extra.Bed	Special.Occasion	Baby.cot	Bathroom
##	0.442	0.569	0.653	0.734
##	Pillow	Flooring	Diet	In.room.amenities
##	0.810	0.847	0.882	0.908
##	Pet	Bedding.matress	Minibar	Others
##	0.934	0.953	0.970	0.983
##	Transportation	Towels.bathrobe	Temperature	
##	0.989	0.996	1.000	

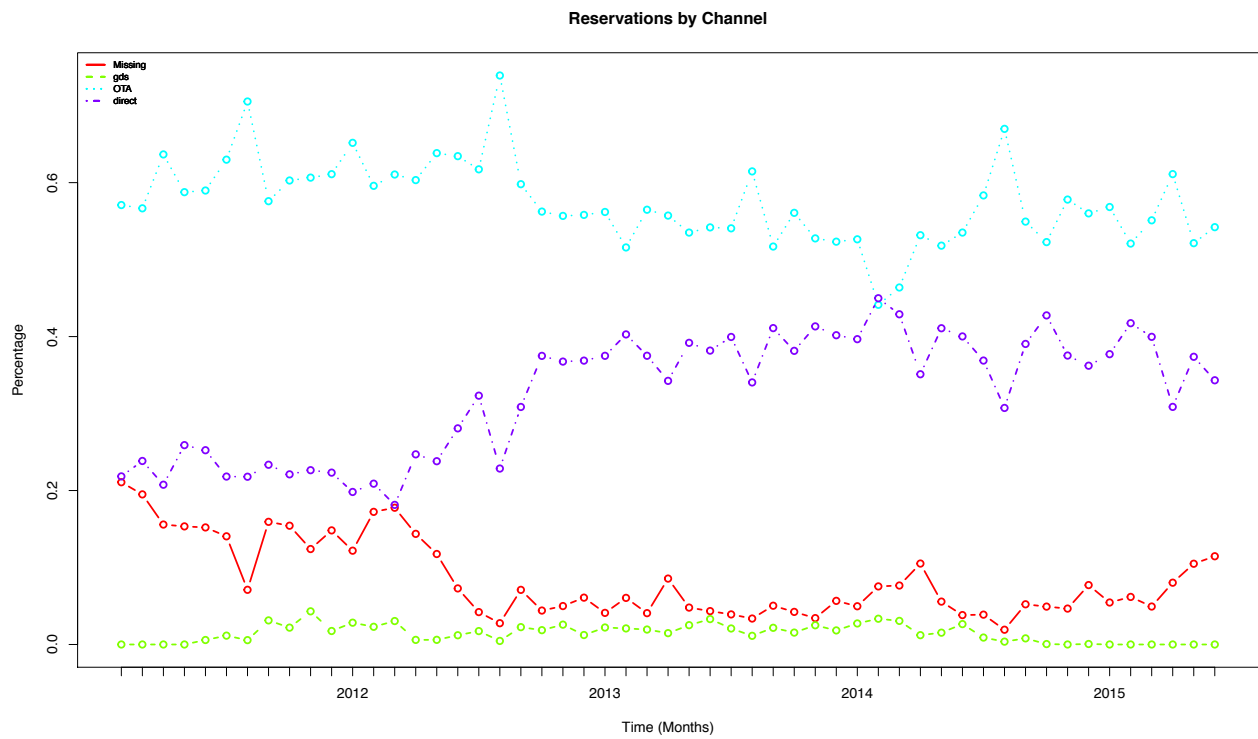
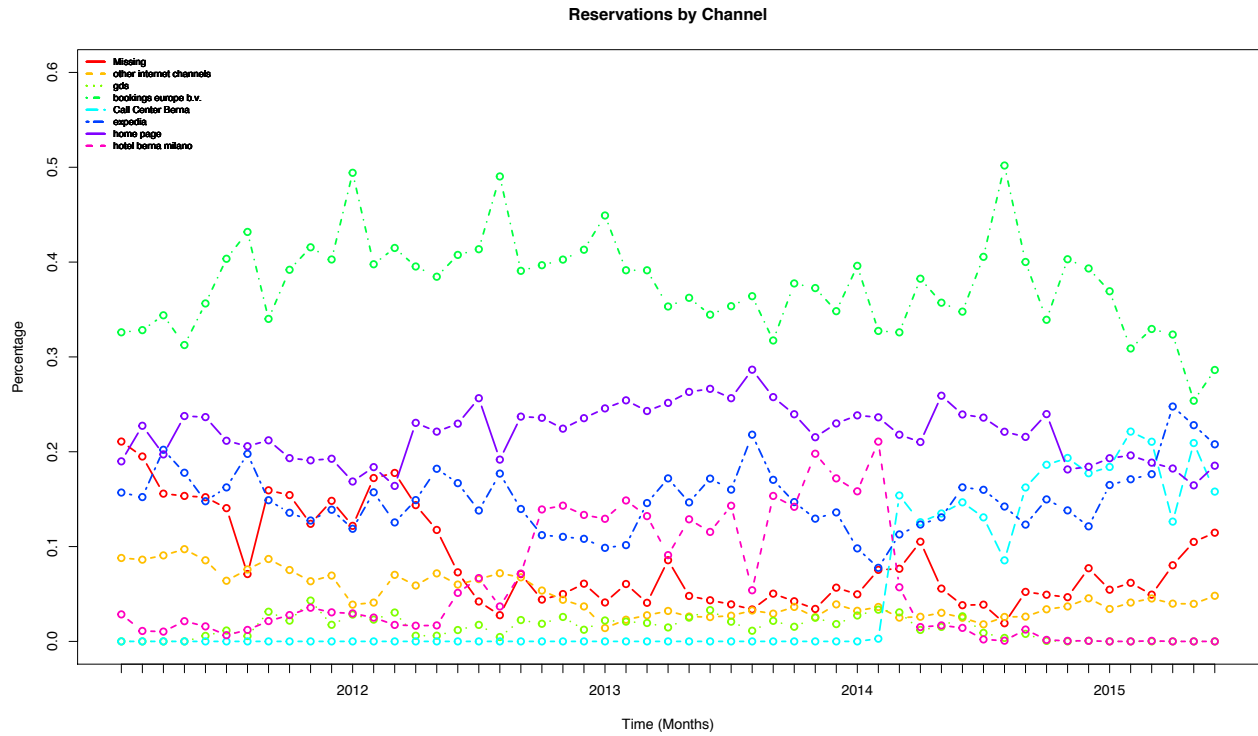
Analysis of Items Requested through Hoxell

The list of items, ordered by highest percentage of requests is:

```
round(cumsum(sort(prop.table(rez), decreasing = TRUE)), 3)
```

##	Drink	PillowType	Temperature
##	0.341	0.497	0.641
##	BedType	PillowsExtra	Towels
##	0.770	0.859	0.948
##	ClothingManagement	ToiletPaper	WelcomeBasket
##	0.962	0.975	0.983
##	KidsAmenities	Newspaper	BathAmenities
##	0.990	0.996	0.998
##	RoomAmenities	Other	Food
##	0.999	1.000	1.000
##	Floors		
##	1.000		

Extra analysis of Disintermediation over time



Stickiness of the personalization effect

The following data shows that once a customer has personalized after reserving via an OTA he is more likely to choose a direct channel and to continue to do so over the subsequent three stays.

Table 1: Number of Reservations by Channel on First Repeat

		internet	gds	bookings europe b.v.	expedia	home page	hotel berna milano
0	62	66	8	904	239	443	86
1	3	5	1	168	7	118	16

Table 2: Percentage of Reservations by Channel on First Repeat

		internet	gds	bookings europe b.v.	expedia	home page	hotel berna milano
0	0.03	0.04	0	0.50	0.13	0.25	0.05
1	0.01	0.02	0	0.53	0.02	0.37	0.05

Table 3: Number of Reservations by Channel on Second Repeat

		internet	gds	bookings europe b.v.	expedia	home page	hotel berna milano
0	25	16	5	286	67	208	48
1	3	0	1	50	4	59	5

Table 4: Percentage of Reservations by Channel on Second Repeat

		internet	gds	bookings europe b.v.	expedia	home page	hotel berna milano
0	0.04	0.02	0.01	0.44	0.10	0.32	0.07
1	0.02	0.00	0.01	0.41	0.03	0.48	0.04

Table 5: Number of Reservations by Channel on Third Repeat

		internet	gds	bookings europe b.v.	expedia	home page	hotel berna milano
0	9	7	1	119	36	129	31
1	0	0	0	13	0	36	3

Table 6: Percentage of Reservations by Channel on Third Repeat

		internet	gds	bookings europe b.v.	expedia	home page	hotel berna milano
0	0.03	0.02	0	0.36	0.11	0.39	0.09
1	0.00	0.00	0	0.25	0.00	0.69	0.06