Media Consumption and Cross Media Synergies

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First there was Print
Then came Radio

The Pepsodent Show
And then TV
And now…

GPS is enabled by Einstein’s Time-Dilation formula

\[ \Delta t' = \frac{\Delta t}{\sqrt{1 - v^2/c^2}} \]

Our World is driven by High-Tech & Exotic Science
Jason was a late bloomer... He didn’t start text messaging till 18 months...
“Stop using the tiny keyboard on your PDA and see if they grow back to normal.”
From the EMAC 2007 Conference Theme (Verbatim)

• Now the challenge is to fight simultaneously on several fronts against fragmentation, saturation and a storm of novelties that appear daily in increasingly diversified markets.

IMC is increasingly important because...
New Technologies Have Revolutionized Communications

“If a tree falls in the forest, but you don’t hear about it on Facebook, MySpace, YouTube or Twitter, did it really happen?”
An IMC program plans and executes various marketing activities with consistency so that its total impact exceeds the sum of each activity’s impact.

An IMC program takes optimal advantage of synergies between media

\[-2 + 2 = 5\] phenomenon
Media Planning Issues

• Budgeting $$
• Allocation Across Media
• Allocation Over Time—Increase, Decrease, Constant, Pulse, Other?
• Allocation under time-varying effectiveness of media
• Online and Offline media
• Consumers control media consumption
• Consumer-created synergy
• Social media
Ad Budgets Are Astronomical

Super Bowl Commercial Prices Fall For Second Time EVER

TNS Media Intelligence said Monday that a 30-second commercial during next month’s Super Bowl on CBS are selling for between $2.5 million and $2.8 million, based on reports from advertisers and media buyers. That’s a drop from last year, when ads averaged $3 million on NBC – a record, according to TNS. Prices
Two profs prove real value of media integration

Perhaps without planning it, Naik and Raman have also blasted another hole in the current media planning process battle-ship, which relies almost entirely on myths, outdated conceptual models, unproven hypotheses and buyer intuition.
Research on IMC

A Deterministic Dynamic Model of IMC (Monopoly)


A Stochastic Dynamic Model of IMC (Duopoly & Uncertainty)

(Kalyan Raman and Prasad Naik, Review of Marketing Science 2004)

A Deterministic Dynamic Model of IMC (Oligopoly)

(Prasad Naik, Kalyan Raman and Russ Winer, Marketing Science 2005)
Temporal Allocation in IMC

• In Automatica (2006), I showed that constant, increasing or decreasing spending patterns can be optimal for the same response function
• But the assumption of a single medium is restrictive
• IMC uses multiple media
• And the assumption of constant effectiveness is limiting because media effectiveness vary over time
• How should budgeting and allocation be optimized over multiple media with time-varying effectiveness?
• The answer is relevant to managing IMC optimally during recessions
Marketing Effectiveness Can Vary over Time

• Changes over product lifecycles, e.g.,
  ▪ Competitors enter or drop out
  ▪ Consumer values shift and behavior patterns change
  ▪ Different customer segments are attracted to the product at different stages in product cycle

• Changes over business cycles
  ▪ Economic upturns or downturns can create changes in demand
Empirical Evidence of Time-Varying Marketing Effectiveness

- Advertising elasticity changes over time (Parsons 1975, Erickson and Montgomery 1980)
- Advertising copy quality (Naik, Mantrala, Sawyer 1998)
- Price elasticity and promotion effects (Jedidi, Mela, Gupta 1999, Krishnamurthi and Papatla 2003)
Dynamic Model of Time-Varying Effectiveness

Sales Response parameters vary over time

Advertising\(\beta_2(t)\) → Sales\(\beta_1(t)\) → Personal Selling → Profit

\[ m(t) \quad c(t) \quad \rho \]

\[ T \quad \theta \]
A Dynamic Sales Response Model

\[ S_t = \lambda S_{t-1} + \beta_1(t)u_t + \beta_2(t)v_t + \varepsilon_t \]

- \( S_t \): Sales at time \( t \)
- \( \lambda \): Sales carryover parameter
- \( \beta_1(t) \) and \( \beta_2(t) \): Time-varying sales force effectiveness and advertising effectiveness
- \( u_t \) and \( v_t \): Sales force spending and advertising spending
- \( \varepsilon_t \): Random error

\[ \beta_1(t) \text{ and } \beta_2(t) \text{ are continuous and differentiable at least once} \]
Profit Maximization with Time-Varying Parameters

Find optimal strategy \((u^*, v^*)\) to

Maximize \[
\int_0^T e^{-\rho t} (mS(t) - u^2(t) - cv^2(t)) dt + S(T)
\]

subject to

\[
\frac{dS}{dt} = \lambda S(t) + \beta_1(t) u(t) + \beta_2(t) v(t)
\]

salvage value: \(S(T) = e^{-\rho T} mS\theta\)
Empirical study

• Data:
  – 5 years of monthly data on a major pharmaceutical product in the US: detailing, journal advertising effort
  
  – Typical life for a patented pharmaceutical product is 12 years. Data period starts at the beginning of the 7th year after product launch.
Kalman Filter Results

- Selling effort effectiveness decreases over time, consistent with literature (Albers, Mantrala and Sridhar 2008; Manchanda and Chintagunta 2004)
- Advertising effectiveness increases over time
Implications for Optimal Spending Trajectories

- At $t=50$, investment emphasis would switch from sales force to advertising.
Comparison with a Constant Parameters Model

• Optimal policy will always call for more spending on sales effort (u) than on advertising (v).

(Raman, Mantrala, Sridhar & Tang, Forthcoming, JIM, 2011)
IMC in a Digital Environment

(Naik & Peters, 2009)
The World Marketers Inhabit Today

Web Search

Competitors

Competitors

Competitors

Customers/Prospects

Employees/Recommenders/Friends/Influencers

Marketer

Products and Services

Messages and Incentives

Word-of-Mouth

New Forms of Media

Agency → Media → Sales Force → Retail
Responses Occur Behind the Marketing Lines

Brand Experiences
- Web sites
- Customer Service
- Tech support
- Retailers
- Distributors
- User communities
- Blogs
- RSS
- Influencers
- Recommenders

Internet Systems
- Electronic Systems
- Organization
- Agencies
- Messages
- Consumer
A Media Consumption Model

Potential Fragmentation Of Attention (Message Impact Diluted)

Potential Synergy Via Simultaneous Media Usage (Messages Reinforced)

Response

Media Consumer

Media Exposure

Media Exposure

Media Exposure

Foreground/Background Media

Time Allocated To Each Media Form

Schultz and Pilotta, ESOMAR, 2004
Four Critical Measures in Media Consumption

- What media form is accessed
- Amount of time spent with each media form
- Media combinations – what media used together and simultaneously
- Which media form has the greatest influence on product purchase
### Measures #1 and #2

**Time US Consumers Spend With Each Media**

<table>
<thead>
<tr>
<th>Media</th>
<th>Avg Minutes per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet</td>
<td>146.3</td>
</tr>
<tr>
<td>Email</td>
<td>132.3</td>
</tr>
<tr>
<td>TV</td>
<td>124.1</td>
</tr>
<tr>
<td>Radio</td>
<td>70.7</td>
</tr>
<tr>
<td>Direct Mail</td>
<td>54.0</td>
</tr>
<tr>
<td>Video Games</td>
<td>48.7</td>
</tr>
<tr>
<td>IM</td>
<td>48.5</td>
</tr>
<tr>
<td>Magazines</td>
<td>46.7</td>
</tr>
<tr>
<td>Newspapers</td>
<td>40.5</td>
</tr>
<tr>
<td>Satellite Radio</td>
<td>19.6</td>
</tr>
<tr>
<td>Web Radio</td>
<td>18.7</td>
</tr>
<tr>
<td>Blogs</td>
<td>14.4</td>
</tr>
</tbody>
</table>

*Source: 1st Half, 2010 – Bigresearch, Inc.*
Media Combinations Are What Create Media Synergy...
The Biggest Challenge in Media Planning Today!
Digital Media will Continue to Evolve and Open up New IMC Research Areas

“It’s a Broadway musical adapted from a YouTube video based on a Twitter tweet inspired by a Facebook comment about a text message.”