How and What Marketing Algorithms Think

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By

Roberto Brognara

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PREFACE

Despite appearances, this does not seem to be algorithms' most successful period. A search for 'algorithms' in Google reports more than 400 million results. 'Joe Biden' counts around 600 million. Google (Trends) also shows that they are at their lowest point of popularity, in terms of searches, since at least 2004.

For the last ten years, however, algorithms have colonised so many social spheres, almost everywhere in the world, including many economically underdeveloped countries, interested in the efficiency and savings they generally ensure and indifferent to the socio-political cost they always entail. The algorithms are no longer in the cone of light, they have become the light.

In their place, two expressions/phenomena of which they are an essential component have taken the stage: artificial intelligence and Big Data. These are broader and more composite domains but, above all, with metaphysical or even mystical aspirations, i.e. above human weaknesses and sensibilities. Thus launched towards universal salvation, artificial intelligence, Big Data and even algorithms are perceived not as human artefacts, but creations that the matter they are made of, numbers, renders superhuman.

This perception is particularly widespread in the marketing community, which is embracing algorithms and neo-cultures based on numbers and formal languages with obvious and worrying fideism.

When algorithms began to show themselves in various spheres of society some ten years ago, one did not have to wait long to hear analyses and criticisms concerning the more or less intentional, more or less 'ideological' 'perversions' present in the results they produced and, from these, irradiated into wider contexts. With the passage of time, this type of political-cultural attention has decidedly declined and in its place, we see an evangelism that even despises the 'results', the 'effectiveness' that is achieved, often modest at first and more than tendentious.

It was this chemical solution that occurs when fideism is mixed with novelty that prompted me to delve into the 'too human' aspects of these technologies too, as I had already done in the past, in the context of broader analyses, for the internet and mobile.

Of the Internet, I had particularly highlighted how it had brought about a profound revision of age-old archetypes in human behaviour[1]1. Of the mobile dimension, I emphasised its role in reuniting the biological self with the digital self, which had been created and matured since the 1980s with the spread of the first PCs[2]2.

Of algorithms, I set out to explore simpler but no less central and disguised aspects such as mechanisms and manifestations of thought from which automation and its effects derive. It may be obvious, even banal, for those who have always looked at science and technology from a humanist prospective, to assume that algorithms have an original thought. That they are written to achieve something inevitably conditioned by the notions, models, and goals of those who programme them. But neither predictability nor banality has this great social consideration today, even more so in business and marketing circles. On the contrary, there is a tendency to believe that they are misplaced, 'mental wanking', irrelevant subtleties when even true.

This is certainly the attitude of the demiurges of marketing algorithms, mainly the so-called 'tech companies', who have not only developed and established them through their planetary activities, but have over time extolled their nature and only progressive effects. They have made an apologia for them as economically viable solutions, always and in any case. And with the more recent intervention of machine-learning in the design of algorithms, they have also proposed them as organisms capable of progressing and improving (in economic results) on their own.

It is precisely that of the results that can be obtained through algorithms that is the perspective of analysis taken here. Not that of the social effects and their possible victims and/or beneficiaries. Nor that of their inherently ideological (authoritarian) character.

In the background of the insights and reconstructions to which we have referred is the hypothesis that the bias or fallacy of the thoughts guiding marketing algorithms (as of all others) may undermine the results they achieve. It may limit them, where other thoughts and other ways of thinking could improve them and produce more economic value, more earnings, more savings, more efficiency, more effectiveness. Exemplifying: how is it possible that Amazon, the champion of marketing algorithms if there is one, from which I have been buying books since 1995, which has data on those purchases and others since then, continues to offer me

[1] Cf. R. Brognara, M. Del Curto, New media and marketing communication, Franco Angeli, Milan, 2007.
[2] See R. Brognara, Mobile Revolution, Franco Angeli, Milan, 2013.

promotions that are not only wrong (that do not work), but inconceivable to even the crudest of sellers? From a day with only romance novels, to titles that are incompatible, even irritating, for my reader profile. Proposals that could not arise even from the blindness of chance. Amazon! And how can

I share the enthusiasm of so many of my colleagues in the world of digital communication that still exalts programmatic advertising, now dominant in the segment of display formats, which nevertheless remains nailed to a performance hardly distinguishable from the fractional clicks of pre-programmatic and non-programmatic banners?

But this has been, and will remain, a working hypothesis and not a proven thesis, essentially because there is no possibility, from outside the realities that design and use algorithms, to intervene experimentally, collect all the information, understand in depth what 'thoughts' are concretely adopted, and formulate alternative hypotheses, to be verified and modified. It is true that much has been published on the algorithms of Google, Amazon, Netflix and others, in academia and journalism, but the possibility of knowing them in depth and, above all, being able to manipulate them on the basis of other models remains unimaginable.

Yes, it is imaginable, and that is exactly what this book attempts to do in the third chapter, 'How Marketing Algorithms Think', to bring to light the kind of mechanisms that drive most marketing algorithms, denouncing their simplism, anachronism and acceptance of the simple instead of the correct. Essentially applying the developments of the most advanced sociological analysis of consumption and communication to the superficiality and crassness of certain visions.

The two opening chapters, 'Automation in Marketing: From Datum to Big Data' and 'Digital Environments and the Eco-system of Programmatic Marketing', provide the historical perspective and contextualise the current success of algorithms in marketing or, as more and more practitioners are calling it, programmatic marketing.

Automation in the management of the most diverse activities promoted by marketers towards consumers is neither new nor recent. Algorithms have taken it to another dimension. This is also due to the increased relevance of the digital dimension in the lives and consumption of billions of people, which has provided algorithms with the optimal eco-system to evolve, data to feed off and communication, consumption, relationship and other environments with which to co-evolve. A co-evolution in which machine-learning, the relatively new and more advanced framework within which algorithms are placed so that they can learn for themselves and improve in the results they achieve. This is specifically what chapter five is about, which recognises the novelty of this approach without,

however, believing that the way of thinking and the thoughts of algorithms can neutralise and elevate themselves. On the contrary.

The chapter of cases, the fourth, has been included and developed with the dual purpose of indicating and updating information on the algorithms that have the greatest impact in the current consumer context, and to derive elements on the thoughts that actually drive them. Not that these elements are important to claim that algorithms think. Nor can one expect to find them, explicit and ordered, in the literature analysing them from different points of view. Nor do interviews with those directly responsible for business or development illuminate with precision and completeness what vision they emanate from. Which data are used to reconstruct the prevailing behaviours and to propose them as models to other eligible parties is the insight that most frequently emerges from the direct testimonies, given by manager, computer scientists or specialists of various kinds. Data exchanged for behaviour and individual behaviour for models. Extreme reductionism.

And it is precisely this substratum that underlies the main problem, both practical and theoretical, that this book intends to address: the vast majority of those who devote themselves to marketing algorithms regard them as neutral solutions to unambiguous problems. They hardly grasp the possibility of alternative solutions and diversity that may reside in a problem.

They are like one of my teachers would say gynaecologists who pretend to solve problems of sexuality, which, as is normal, can also totally disregard organs and functions. They are certainly not ‘gynaecologists’ of the aforementioned kind who have agreed to comment on or discuss with me the various topics discussed here.

No small part in the preparation of this book was played by all the activity required for the design of the ‘Marketing Algorithms’ course that the IULM University of Milan may soon launch. This is a novelty in the panorama of marketing-focused educational offerings that, on the one hand, recognises a reality that is as important as it is still ‘submerged’ (programmatic marketing) and, on the other hand, critically analyses its characteristics and functioning, outside of naive or interested narratives.

Roberto Brognara
Milan, June 2022

INTRODUCTION

The story of marketing algorithms is the story of how, what and how much data can be collected (so that it can work better and better). It is a story that began in the 1980s, with the pioneering archiving technologies used mainly in large-scale distribution and with credit cards; it has been powerfully reaffirmed with the spread of digital, networks, services and devices; it has been consolidated in the last decade, both with the blossoming of the data economy and eco-system and with the practical, massive, automated and advanced application of data to marketing.

It would seem, however, that this parable has reached yet another caesura in these very years that tarnishes its future. On the one hand, programmatic marketing has not yet managed to overcome widespread scepticism about the inadequacy of its results[3]. On the other hand, an event known as the 'cookieless era'[4] is on the horizon, i.e., the more than ever confirmed extinction of third-party cookies as of 2022.

The most direct consequence of such a scenario will be the drastic reduction of actionable data on general surfing behaviour, i.e., practised beyond the 'boundaries' of small and large web properties, by the whole, rather than specific segments, of web users.

A consequence that will undoubtedly be remedied, which will not leave the system in a state of shortage and which will easily be taken advantage of to overcome important limitations inherent in the cookie system. But which, nevertheless, has already left a mark and could have an impact on the very vision that fuelled and guides programmatic marketing.

In fact, it is evident that algorithmic marketing is the child of a marketing culture and specific environmental conditions that are exposed to doubts and unknowns of various kinds at this juncture.

Apart from the aforementioned reflection on the effectiveness of the programmatic and automated approach, effectiveness in terms of absolute

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[3] G.R.T. White, A. Samuel, 'Programmatic Advertising: Forewarning and avoiding hypecycle failure', Technological Forecasting and Social Change, Volume 144, July 2019.

[4] In its essentials, the 'cookieless era' will be determined when even Google/ Chrome, as of 2022, cease to support third-party cookies, as the other Apple/Safari and Firefox browsers have already done.

and comparative results, at least two issues that are as new as they are disturbing should be highlighted.

The first is the increasingly extensive, deep and close correlation between data collection and privacy violation, a correlation that, among other things, is not limited to considering only certain data, collected only in certain digital 'environments', but indiscriminately all data.

In this Manichaean opposition, two of the main elements that stoically characterise the digital, the technological inevitability of tracking and the irrelevance of much of the information that (unavoidable) tracking produces, lose all significance and, with it, the possibility of influencing political decisions about whether and what data to collect. Hence, in the absence of a reasoned and reasonable approach to digital data, the cultural and political sensitivity regarding privacy, what it is and how it should be protected, becomes discriminating. A sensitivity that differs between the various geo-political areas of the world (the US, Europe and the Far East, for example, each with different regulations in this area), between individual subjects and the variety of socio-economic realities and forces that contribute to the consolidation of a certain activity or, vice versa, slow it down and hinder it. This is also the case in marketing.

Unencumbered by 'mature' and properly thought-out definitions, the issue of privacy is so powerful that it not only unleashes draconian measures with regard to data collection, but also possibly exacerbates the reversals for cultures and practices that feed on data.

Around 'practices' revolves the second issue brought to the forefront by the coming 'cookieless era'. Can a trend, that of algorithm marketing, thrive by precluding the use of the most important resource, data, from an important part of the market, i.e., 'third parties'? This is even more the case in a highly concentrated market (Google and Facebook), in which the quality of the resource depends heavily on its quantity and how general, transversal and global it is.

Third parties, the only ones heavily penalised by the banning of their cookies, did not play a secondary role in bringing programmatic marketing to the stage it is currently at. They have contributed decisively to its technological development, its 'ideological' and cultural acceptance, and its, more than ever, refinement in the direction of machine-learning or others.

This, without being, at least in principle, the first beneficiaries and without having committed more or worse privacy 'violations' than what 'first parties' and other spurious realities have done and will continue to do. On the other hand, as already mentioned and further expanded below, data and their collection are nothing new, neither in digital nor in recent years.

Brands, many powerful so-called ‘first parties’ have had them for decades, but only recently have they produced original market visions and actions with data, with the contribution of ideas, economics and expertise from ‘third parties’.

In short, another stretch of the path that has brought data into the marketing world seems to be nearing completion. A stretch of the path that Google will close, just as it had symbolically begun, on 4 December 2009, when it revealed to the world from its blog that the personalisation of search results would be extended “... to signed-out users worldwide, and in more than forty languages”. That is, that the customisation of search results, instead of being voluntarily requested (sign-in), as from 2005 until then, would have to be voluntarily refused (sign-out), by changing the search settings.

For the first time, an algorithm produced mass effects (there were approximately 2 billion Internet users in 2010, and Google’s share in the use of search engines was already close to 100 per cent), in the name of ‘personalisation’, ‘relevance’, and for the benefit of presumably more effective and certainly more lucrative marketing activities. At least for Google, which could not only offer advertisers the possibility of customised campaigns (according to 57 criteria, or ‘signals’), but also, to a more or less extensive extent, filter the context of use of those campaigns, the ‘content’ supporting them.

In 2009, other algorithms were already operating, with a good degree of sophistication, to support the business of the likes of Amazon or Netflix. And the programmatic advertising movement was moving with long strides. But the scale, effects and conceptual differences from Google were remarkable.

In any case, since then, the presence and incidence of algorithms has not only increased in all spheres of social life and even in marketing activities, but also the ambition to customise services and solutions for which these algorithms are implemented.

But the obscurity of these totally automated processes has also grown, both with regard to their operation (protected like the Coca-Cola formula) and the general criteria by which they are conceived and designed. Closing this phase in the programmatic movement, with a bottleneck of the resource that best, also in cultural terms, fed it, what does the near future hold?

Obviously, they are resuming with renewed vigour all the activities already under way to arrive at data collection systems that overcome the structural limitations of cookies, in particular their caducity and only partial validity in the mobile sphere.

The topic of cross-device identification is more topical than ever, as are the various solutions that propose to solve it. They come from different market sectors and in particular from those who already hold leading positions in the advertising business. Google in the lead, but also Apple, which in the desktop sector was the first to lash out against data collection in the name of privacy, but in the mobile sector has never stopped doing so, and not only for the benefit of the experience of its users[5].

Amidst the physiological confusion over which technological solution and which market activities, with which players and policies, will support its adoption, the tendency to strengthen the positions of the large players, those at the head of digital 'platforms' with a broad articulation and trafficked by hundreds of millions of users, seems quite clear. Which are 'walled gardens' crowded not only with content, but also with data, accessed only by a part of the digital user base (more or less forcibly) and only accessible to marketers interested in the entire garden, under the conditions imposed by it.

This is an effective description of how a walled garden can be understood in digital marketing:

> ... you have reached the 'Walled Garden' level when you can force your clients to use your whole marketing stack to run their campaigns: Your DMP for Audience Targeting based on your Data; Your DSP to push Ads on selected inventory (yours and/or selected 3rd Party inventory); Your DCO to handle the Ads personalisation / Ads hosting. And then, the magic part is that even if you give all the proper features needed to manage campaigns, you don't allow your customers to export any data. You only give them aggregated metrics that you measured[6].

Algorithmic marketing can, on the one hand, sleep soundly, because its development and procurement are in the hands of the same people who so to speak created it: the big tech companies. They will certainly refine it further and make the most of what constitutes their main asset. But does the maximum they will get for them coincide with that of the marketers and advertisers? It is not a foregone conclusion, and in several passages and references in this book, doubts are raised as to whether the visions and strategies of the platforms coincide with those of the marketers or, more

[5] For almost ten years, Apple has integrated the iOS IDFA (Identifier for Advertisers), specifically dedicated to tracking behaviour and sharing data with marketers, into its iOS system. It has announced its imminent closure and replacement by another system, over which it will exercise total control. In the name of privacy of course.

[6] https://bit.ly/2VDIjwQ.

generally, as to the real ability to understand the complexity of reality and thus maximise the effectiveness of the marketers' actions.

It is true that another of the foreseeable consequences of the 'cookieless era' will be a greater commitment on the part of the 'first parties', i.e., the brands, both in the collection of data and in their exploitation in marketing, through algorithms or otherwise.

But not only history, also the present shows clear signs of development of companies in at least the second of the activities, the valorisation of data.

Salesforce estimates that 43% of brands are failing to use even half of their CRM's data capabilities. While in February 2019, BCG released a report detailing that the 200 top global brands are still facing major challenges like not making connections across consumer touchpoints and devices (83% of respondents), inadequate cross-functional coordination (80%) and lack of data integration and activation across channels (50%).

And the responsibility is only partly theirs, as they are physiologically dedicated to running their own business as usual and are only attracted by 'collateral' innovation, in services supporting their business, if it is developed and tested by others, suppliers of various kinds who, in the case of programmatic marketing, coincide with the current 'third parties'.

One issue this book does not address is the definition of 'algorithm', which has evolved and blurred as it has spread. The one proposed by Merriam-Webster Dictionary[7] is suitable both to circumscribe the segment of software referred to, and to contain at least the bulk of the (marketing) objects that will be dealt with.

Even more so do we recognise the definition and approach of Ed Finn, who has developed algorithms as 'cultural machines' in a primarily philosophical sense.[8] Many programmers and also many marketers may raise their eyebrows at this definition, referring to an 'object', of lines of code, which could not be more aseptic. Nonetheless, the starting point of this analysis is precisely that an algorithm is a cultural artefact in the dual sense of being an expression of human ingenuity and the bearer of specific sets of values and beliefs. Limited by human intellectual capacity in terms of power and conditioned by the ideas that humans (the programmers) share in relation to the tasks entrusted to them.

Regardless of one's preferences on the general definition of an algorithm, there is no longer any doubt about the cultural conditioning, as

[7] "An algorithm is a procedure or programme that solves a class of problems through a finite number of elementary, clear and unambiguous instructions".
[8] E. Finn, What do algorithms want?, Einaudi, Turin, 2018.

human (and vice versa), that characterises their functioning. The scientific literature produces empirical research and analyses of various approaches on the sociological substratum present both in the development process, in the choice of data to be used, and in the functioning of algorithms. Not to mention their results, which, analysed with the inevitably and entirely cultural criteria of humans, are far removed from the ideal solution to a problem.

In the specific case of marketing algorithms, human conditioning has been identified, explored and demonstrated at two levels: that of the biases, implicit but no less incisive, which corrupt the functioning and results, and that of the translation of the objectives (of the algorithm's objectives) into the business results in instructions and commands for the machine.

Just two examples in anticipation of a more extensive treatment of this topic in Chapter 3, which in line with the general approach of the book (analytical rather than essayistic) is based on a broad exploration of the reality of marketing algorithms in its different facets.

The conducted exploration starts from the origins of the use of algorithms in marketing and considers, in the first chapter, the historical evolution of the main resource that characterises them: data.

The desire for automation spread in marketing with the commercial maturation of information technology, which until the 1970s was the prerogative of very few hardware manufacturers whose machines (mainframes), services and offers were within the reach of very few companies. This is also the reason why the automation culture, i.e., the mechanisation of not only material functions, was not opposed, but did not arouse much interest. On the other hand, between the 1970s and 1980s, with the development of personal computing and the commercial evolution of large computers, the rise of the software sector (often specialised in the performance of business activities), etc., automating certain activities became not only desirable, but possible. In particular, in those years, the marketing culture turned decisively towards the 'customer relationship', which presupposes 'records' (continuous information on individual consumers over time), memories in which to organise them (databases) and software to process them.

From this moment on, hardware and software do not cease to perform, to articulate themselves into commercial offers accessible to any economic reality sensitive to consumer data (not only consumption data) and the eco-system of automated marketing takes shape. Which, however, achieves an evolutionary leap with Big Data, with the possibility of using huge computing resources with huge amounts and varieties of data,

regardless of human intervention. That is, what marketing algorithms currently do.

The entire parabola of programmatic marketing, and probably of marketing tout court, would have been different if the last two decades had not seen the consolidation of real life 'environments' as an alternative to the traditional and commonplace one that is reality. The second chapter focuses precisely on how the digital environment, at least in its two main dimensions, the web and the mobile, is today not only as socially present as the real one, as functional for marketing as the real one, but also particularly favourable and conducive to a life of comfort and success for the algorithms. The digital environment increasingly constitutes the eco-system in which all automated marketing activities can be born, grow and reinforce themselves, achieving in it all kinds of objectives or even, as frequently happens, crossing its boundaries and imposing itself in reality (as in the case, for example, of programmatic applied to TV spaces).

It is difficult to quantify the economic value of automated marketing, especially if one intends to limit it to the most modern algorithm-based activities. A figure generically referring to 'marketing automation' reports, for 2020 on a global level, the figure of approximately USD 5 billion.[9] It is easier to recognise the contours and general articulation of what has now become not only a market but also an industry sector. A name that satisfactorily sums up this fledgling sector and differentiates it from the broader and more traditional marketing automation sector is 'programmatic marketing', which will also be used here with special reference to marketing activities supported by algorithms. A name, that of 'programmatic', which is enjoying vast popularity in business community thanks to the impetuous growth of programmatic advertising, but which, due to its literal meaning ('... happening or done according to a plan...') and some more recent conceptualisations in the field of marketing[10] returns the due peculiarity to all the topics discussed here.

It should come as no surprise that Google, Facebook, Amazon and other giants of the digital business are absolute protagonists of programmatic marketing, playing multiple roles in it and participating with a plethora of other more or less large and specialised players in a value chain that we will try to outline again in chapter two.

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[9] https://bit.ly/2QWgURa.

[10] 'A programmatic approach to marketing focuses on creating highly automated marketing systems and processes that can be steered by business objectives. Programmatic methods can be applied to all of the domains of the marketing mix, namely, product, promotion, price and place' (I. Katsov, Introduction to algorithmic marketing, Ilia, 2018).

In contrast to the analytical approach that as already mentioned characterises all the other chapters, the third chapter, the one dedicated to the 'sociological substrate of marketing algorithms', is decidedly 'thesis-driven', i.e., it argues for the presence and conditioning of sociological assumptions in the writing and functioning of marketing algorithms. In particular, assumptions from the sociology of consumption and digital communication, reflecting analysis and convention on the how and why of certain consumption behaviours and on the mechanisms of fruition and interaction with marcom in the digital environment.

Its nature as a "thesis", as a hypothesis, does not depend so much on the existence of a thought that denies it, asserting the "neutral" principle of optimisation, but rather on the intention to prove it through the analysis of the main marketing algorithms operating in the global market today: from those of Google and Amazon for search results and cross-selling, to those of Facebook and Ryanair for targeting and pricing. These and the other algorithms analysed in chapter four should show with sufficient clarity what are the different thought patterns that drive them, i.e., what, more accurately, they think.

As mentioned in the table of contents, the algorithms analysed in some depth (as far as it was possible to go with the publicly available sources) became known as pioneers, or the best, or the most original at least in a specific activity pertaining to marketing. Activities that marketing normally deals with and/or should pay close attention to, if only because its effectiveness depends on them.

This is certainly the case with Google, the search results it offers and thus the algorithm designed to achieve this. The most widely used search engine in the world, which is credited with the objective of 'organising the world's information', is probably the single source of greatest influence in the construction of both the general and individual mindset, and thus also of the specific mindset of consumption and consumers. Dimensions, the latter, on which it intervenes directly and with initiatives that are as powerful as they are algorithmic.

Among the various areas in which Amazon has brought digital innovation to the most high and profitable levels, there is that of 'economic enhancement' of the customer, which could also be translated as making him buy more than planned. And if before the ecommerce giant's emergence this natural and 'ancestral' function of marketing was basically entrusted to different mixes of intuition and deduction, it is now scientifically designed and entrusted to algorithms. In Amazon and outside of it.

Equally ancestral in marketing is what Facebook has done and continues to do with originality and reliability unparalleled in history: grouping consumers with a probable inclination towards a product or service. Segmenting the market and allowing targeting on the basis of real and granular behaviours, systematically detected and processed by the complex of algorithms that now controls the entire life of the social network.

Pricing and its definition is another traditionally central theme in marketing and, this too, has been the subject of algorithmic attention since its inception by Ryanair, airlines and the tourism sector as a whole.

Slightly more blurred, but equally relevant for marketing in the broadest sense (not only films and entertainment), was the field of intervention in which Netflix ventured, which first entrusted the exploration of audience tastes and trends entirely to algorithms, the extrapolation of genres in progress or virtual, and then experimented with various forms of cooperation between advanced automation and human participation. Advanced as human one might even say.

With Salesforce we were able to see the birth and full maturation of the algorithmic approach to customer relations and what results were achieved in both its fluidification and its 'tightening'. What historically has been the field in which data and automation have always been protagonists, CRM, now offers insights of particular and general interest regarding the possible reactions produced by the encounter of 'hot' matter (human relations) and 'cold' tools (programmatic concepts and modes of intervention).

The last cases explored in chapter four do not have a name because as such there are none known or because there are none that excel in their field. Nevertheless, they deal with central themes and products in contemporary marketing, such as media planning, the 'human-like' interaction between a brand and its audience or the more general and strategic effectiveness of marketing communication, the one to which the brands that are developing and using algorithms and dedicated competence centres in-house aspire.

Automation in media planning, which drives, at least in economic terms, the entire programmatic marketing movement, shows proven and successful practices, but also evident growth limits, perhaps structural and fatal, perhaps culpable. Limits that, in the case of chatbots, appear equally evident, but for the time being clearly attributable to the youthful phase in which these technologies find themselves.

It is tautological to argue that marketing algorithms primarily serve business interests. Rather, it is worth reflecting on whether they are doing this to the

best of their ability, as tools whose imperfection stems from design errors rather than technical limitations).

This analysis activity, which will make use of studies and articles produced on individual cases and, where possible, first-hand information gathered directly from the companies concerned, in addition to feeding the general conclusions on the heuristics of the algorithms, flows into the chapter on case studies, where each algorithm will be described and 'reviewed' in detail, especially for the benefit of those who wish to reflect on the margins of improvement that a change of vision, more accurate analyses of contemporary consumer behaviour could bring to the marketing programme.

The last chapter is dedicated to an exploration of the nearer future, the already present, of marketing algorithms. That is, those conceived and operating according to machine-learning principles[11].

One might believe that in their striving for optimisation, machines ignore any notion of the general context in which they operate (society and the market). And that the improvement of results, even infinitesimal as long as they are progressive, can justify their scientific validity and business. But one may also think as in our case that such a step may further increase the fideism of a scientific or tactical nature that is accompanying the affirmation of programmatic marketing, shielding limits of both potential and results and who knows? precluding much better performance.

The disciplinary and technical perimeter within which the various problems lie is fairly well defined, although its boundaries are widening in some areas and blurring in others.

The marketing area is among those most accurately and permanently traced. Although evolving, infiltrated by previously different and/or antagonistic activities (e.g., CRM), with its manifold activities in a dynamic equilibrium and uninterrupted budding of novelties, marketing remains something well-defined in which the topics and analyses conducted here certainly fit. Nothing considered should appear alien to the marketing community, everything should be relevant and not purely an academic exercise.

The semantic area 'algorithms' is also well mapped out, strong with a cultural tradition and current activities that keep it solid and sheltered from so many self-critical reflections from 'heretics' in the world of formal

[11] 'Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer software that can access data and use it learn for themselves'.

languages and computer science. There is not, nor has support been sought in this disciplinary field. Rather, the heretical visions of algorithms have been of great use, which, when even over-indulgent towards philosophy, have shown great sympathy with the postulate of the pre-analysis: that algorithms think.

Where algorithms and marketing converge, in that area of semantics and economic-professional reality, no particularly solid footholds can be found. It is true that data and automation, from which marketing algorithms are directly descended, are familiar presences in almost every kind of business function, but the level reached today both in the production and processing of data and in the automation of certain activities proposes a reality that is far from being mapped and adequately located in the cartography of marketing.

In fact, speaking of 'marketing algorithms' mentions specific referents, but not a class or category comprising multiple referents with certain characteristics. Even juxtaposing, in some cases, specific algorithms with marketing, as in the case of Google or Netflix, might raise more than one reservation or perplexity.

Nonetheless, the spread and relevance gained by algorithms to perform marketing functions have at least consolidated the ground on which our analysis is moving and, above all, have shown that the perspective of algorithms could indeed be extended and embrace the whole of marketing and not just a specific field of it, as in the case of advertising.

Advertising is the marketing activity that brought the use of algorithms to industrial and economic maturity. And it is the one that still prevails today in the theoretical or applicative investigations into the combination of algorithms and marketing. Advertising was even responsible for the debut of the term/concept 'programmatic' in business (the same had already happened in financial trading, but had not used that name).

A term, 'programmatic', which may make one think of something particularly sophisticated, but which, on the contrary, has as its only semantic link to its referent the banal meaning: 'of the nature of or according to a programme, schedule, or method'. Only the sensationalistic and creative verve of the first digital advertising marketers, around the year 2000, was able to launch programmatic advertising as particularly innovative, rather than 'simply' internet-based for the functions of ad serving first and also buying later. Immensely innovative and disruptive was the Internet and what it was incubating in marketing, business and society, but what came to be known as 'programmatic advertising' would only be the seed of a change that would later prove to be very important more in economic terms than for specific novelties or transformative impetus to the system as a whole.

In fact, programmatic advertising is now the dominant mode in all advanced markets in the display advertising segment, is extending its influence, philosophically and technologically, to other, not purely digital media, but continues in the wake of algorithmic activities that are certainly more sophisticated and advanced in their market applications.

It is also for this reason, because of the renunciation of not only economic but also cultural leadership, and in opposition to the custom of assimilating digital marketing and advertising, that in recent years the semantic area has made its way, a strand of study and research and, detached, business practices referable to 'programmatic marketing' or 'algorithmic marketing'. Obviously focused on a broader thematic range than just advertising and, above all, oriented towards developing its characterising aspect, the algorithmic identity, towards more ambitious goals. Starting with the most basic and audacious one that marketing continues to pursue: how to sell more and better.

And speaking of ambitions, that of this analysis is to become part of and contribute to the emerging movement of programmatic marketing, of algorithms applied to every area of marketing. As well as presenting the issues and problems of more immediate evidence and relevance, it proposes at least two equally obvious but not so widely recognised relevance: the importance of the social context and its interpretation (when algorithms are being designed) and the possible systemic fallacy, which, as with all thinking beings and the fruits of human thought, also leads to partial, unexpected, erroneous, arbitrary etc. results. Imperfect and yet perfectible.

1.
AUTOMATION IN MARKETING: FROM DATUM TO BIG DATA

Automation in marketing, as in social life more generally, has always been linked to technological evolution. In the case of society, it all began with the 'technica curiosa' in the 17th century. In marketing, one had to wait for computer systems to mature, i.e., for the accessibility of specialised hardware and software to reach certain levels. It has always been technological progress that has given rise to the idea and theories of the replication of typically human, mechanical or intellectual, elementary or sophisticated functions, such as those with which marketing is also dealing today.

Marketing as an orientation or corporate culture has more than a century of history, thought and practice behind it, and since its origins it has retained the centrality of analysing and exploring the market, in particular the consumer. And, for this purpose, it has always attached importance to and massively used data, at first of a quantitative nature, either already existing or collected ad hoc, and later on also qualitative, looking for more and more reliable ways to integrate them.

Then as now, consumer data are the energy that drives marketing and gives it unity and coherence. Their quality has always been vital and when the time came to use them to automate certain functions, they were already present in large quantities and enjoyed sufficient reliability. Even the most rudimentary forms of marketing automation were born with the ambition of increasing effectiveness, improving results and performance, rather than as a mere substitute for particularly repetitive and/or labour-intensive activities. Automated practices emerged in a context of cultural as well as technological maturity and marked a new path in marketing and marketers' approach to the market.

Today's algorithms are not the early fruit of a new technological set-up, nor are they 'mirabilia' to be looked upon with curiosity and suspicion, but rather the latest expression of a journey that began in the 1970s, passed through to different stages and has now blossomed into a particularly happy stage in which cultural elaboration and technical instrumentation are intersecting. 'Big Data', among its many meanings, can

also be seen as the celebration of an ideal movement that has been present in marketing for decades and is now close to hegemony, both cultural and economic.

Big Data proposes, elevated to full power, the three basic elements of marketing automation: strongly data-centred ideas and visions, abundantly available and processable data, and adequate instrumentation to process them.

Varied types of data and appropriate tools for their processing are more recent phenomena, closely linked to the emergence of the internet and other digital dimensions. The data cultures that have infiltrated marketing over time are more remote, with blurred contours, but no less decisive in determining the current physiognomy of programmatic marketing and marketing tout court.

1. Data culture

The economic roots of marketing have made it a data-friendly discipline from the very beginning. For the most ordinary distribution and sales activities, data have always been used as an indispensable aid for management and ex post verification of results. And they soon became such also in planning, replacing other criteria such as production or logistical capacity, empirical methods or simple experience.

It was, however, with the appearance of the first magnetic storage media and processing tools that data ascended to the dual status of dominant language and connective tissue for ever larger areas of business activity and, to a particularly pronounced extent, in the marketing area.

Around the same time, the first decades of the 20th century, the foundations of mathematical statistics were being laid and some of its fundamental concepts for the future use of data in decision-making of all kinds, from political-administrative to business-oriented.

The ‘standard deviation’, ‘correlation’ and ‘regression analysis’ began to reveal their potential in the interpretation and even prediction of social behaviour, while at the same time conferring on data, of all kinds as long as they were true, the status of an increasingly valuable resource.

First among the corporate functions to regularly understand and ‘visit’ the new landscape in which large quantities were formalised and manipulable, it was marketing that also quickly distilled strongly data-based ideas and practices. It began to produce its own data (with market research), to store them in databases, and above all to use them systematically in every planning and control process. And when, in the 1970s, information technology reached a point in its commercial life that finally made it

accessible also to corporations, marketing was by then ready to propose a cultural model and various sub-cultures inspired by data, in some or all of the activities included in its mission.

From that moment on, resting ever larger portions of thoughts and actions on data, possibly automating their execution, became the daydream of marketers, engineers, programmers and entrepreneurs, all united by, among others, the conviction that doing so could improve human performance. A dream that, with today's algorithms employed in digital contexts, has taken shape, has begun to affect reality, but without fully realising itself, as it appeared in its most dreamlike dimension.

Along the way, alongside historically relevant but episodic personalities, innovations and cases, a scientific-discipline current of thought played a particularly decisive role in consolidating data as a shared culture and practice in marketing. It was 'data mining' which, ignoring its nominalist history, imposed itself and continues to be '... a process of discovering patterns in large data sets involving methods at the intersection of machine learning, statistics, and database systems'.[12]

It has been rightly pointed out that the name lends itself to misunderstandings because in the fundamentals of this activity, which took a sufficiently defined form in the 1980s, there is not the extraction of data, but rather the search for and identification of the meaning that large quantities and varieties of data might conceal. Even more rightly, in later years, this discipline also became known as Knowledge Discovery in Databases, specifying with due clarity its object (databases), predicate (discovery) and subject: knowledge.

The core of this new way of looking at and using data, interdisciplinary since its inception, spread even more interdisciplinary, counting and colonising even marketing.

Where previously empirical reasoning, experience or HiPPO (Highest Paid Person's Opinion) logic was essentially relied upon, recommendations and investments came in to support data-driven collection, processing and decision-making. Branches of marketing already immersed in a data-centric environment, such as CRM or direct marketing, they radicalised their approach even more, widening the conceptual and practical furrow with those in the company, even in other marketing activities, who resisted such a strategic evaluation of data.

When, finally, the universalisation of the digital dimension and the unprecedented amount of new data also imposed itself in terms of business as usual, the data culture was further defined and consolidated. No

[12] "Data Mining Curriculum". ACM SIGKDD. 2006-04-30. Retrieved 2014-01-27.

company, no marketing activity today disregards not only the use of data, but also the aspiration to be completely or partially data-driven. As, moreover, the no less yearned-for digital transformation wants.

On the fertile soil of a 'data culture'[13] now hegemonic, a veritable eco-system of data has grown up, where new specialisations and new skills, professions, products and a wide range of critical topics keep appearing, which Big Data itself has put under the spotlight of public opinion and various professional communities. An equal and opposite movement that, as often happens when a culture takes root, produces a counter-culture, hinged, in the case of data, on the defence of old practices (often for reasons of corporate self-defence) and on alarm about the side effects of new practices.

Among the latter, all issues related to the protection and possible violation of privacy are particularly felt. In programmatic marketing, these have taken on a special relevance and notoriety as a consequence of the possibilities of psychological profiling on the basis of behavioural data collected online and using them for obscure and partisan manipulation of social and political occasions of various kinds.[14]

All the reservations related to what Alvin Toffler called 'information overload' in the 1970s have regained momentum and new arguments. Re-produced over the decades under different names (up to the recent 'Infobesity', 'Infoxication') in relation to different phenomena, the idea that there was no direct relationship between increased information and improvement in decision-making has progressively refined and consolidated. And while Toffler, in his time, referred above all to the limits that then existed in the ability to process so much information, subsequent experiences and analyses have pointed in particular to the human cognitive

[13] "Data culture is the principle established in the process of social practice in both public and private sectors which requires all staffs and decision-makers to focus on the information conveyed by the existing data, and make decisions and changes according to these results instead of leading the development of the company based on experience in the particular field". "The idea of data culture has been under the spotlight of business field since the beginning of the 21st century, and is gaining popularity in recent years. Although first introduced in a scientific approach, the idea is now associated with both the science field and social sectors". Ramaswamy, Poornima (June 2015). "How to Create a Data Culture" (PDF). Cognizant. Retrieved 29 November 2017.

[14] With regard to the unscrupulous use of data in electoral processes, the activities of Cambridge Analytica in particular in the 2016 US presidential elections and in the Brexit referendum had worldwide resonance.

limits (decision-making) and structural limits, implicit in the heterogeneity of the processed data.

Accompanying reservations of this nature, in the past as today, are the more abstract but equally pernicious ones concerning the ease with which the abundance of data is transformed, in the social discourse of which it is the protagonist, into data intoxication, i.e., into overestimation and/or misrepresentation of the effect that large quantities of data can produce. Either because of the mechanisms of today's system of social communication or because of precise economic interests (in making a useful medium the recipe for success).

Equally topical are all those reservations that can be traced back to the category of psychological setbacks triggered by a situation of sudden abundance, leading to (corporate) behaviour reminiscent of bulimia or anorexia.

In the first case, there is an escalation in data collection that never ends and always leaves one unsatisfied. In the second, there is a blockade that, amidst contempt and fear, renounces every possible contribution that data can offer. A blockage similar to that of someone who feels simply and totally overwhelmed by circumstances.

But in parallel with the ever-growing repertoire of cultural objections to data culture, there is another strand that focuses on the efficiency of data in solving various marketing and business problems. 'Effectiveness' in terms of the ability to achieve the final purpose for which an overall plan or an individual marketing campaign is conceived. As was already the case in the first season of 'data hybris' in the 1980s, the concrete effects obtained from the enormous effort to process and apply the indications derived from top-quality data were more disappointing than promising. At that time, important advances in the understanding of consumer behaviour, new ideas on how to optimise actions to achieve this, and important and unexpected applications came thick and fast.

But no direct answer to the original marketing question: how to sell more?

Programmatic marketing has now reached numerous fields of application and for a few years now it has been possible to follow the results, which are odd, depending on the field being considered. For example, they are remarkable in sales promotions and modest in performance advertising.

In the culture of data, those elements of fallibility attributable to the human capacity for understanding and solution were taken for granted, and progress towards the best of all possible solutions was taken for granted. Conversely, in the counterculture of programmatic marketing, the idea of

the irreducibility of the complexity of marketing to quantities alone is reinforced, and the manifold evidences of a fideistic rather than pragmatic and genuinely results-oriented approach as should also be the case in marketing in general are exhibited.

2. Data types

Not surprisingly, the history of automation in marketing and the history of marketing data have a common origin, despite the fact that marketing did not yet exist at that time.

It was the last years of the 19th century and more and more shops were starting to use cash registers, in order to better control salespeople and, above all, to keep a more reliable track of sales than registers. It did not take long for this information to be used not only for accounting or management reasons, but also for sales planning, i.e., as a first-hand indication of consumer behaviour, both with regard to the products on sale and the initiatives implemented by the retailer.

Sales data have been and remain among the most important resources in marketing and are the first in order of time, and perhaps in importance, of the more than ever current category of 'behavioural' data, i.e., a direct expression of the actual behaviour of the subject they refer to.

In the history of marketing, there are two other important types of data, which can be traced back to as many different sources: in the early 1900s in the USA, structured data collected mainly by public bodies (tax registers, census offices and national statistics offices, etc.) began to be used, and in the 1930s market research was consolidated. These were mainly quantitative, based on structured questionnaires, but also qualitative, conducted through individual or group interviews with a psychological slant. In both cases, the data were specific, deeper in exploring the reasons for a particular choice and also more prospective. But they are not behavioural, but belong to the category of 'declarative' data, i.e., communicated by the interested parties to those in charge, human or otherwise, of their collection. In contrast, sales data present as much subjectivity as superficiality. And they tend to be a-temporal.

For a long time, up to the 1980s, quantitative and qualitative information lived and were used separately, despite the fact that, at times, quantitative techniques allowed 'open questions' to probe qualitative aspects and the qualitative techniques tried to quantify at least something of what they collected. It was not possible to integrate them, except in the more or less happy syntheses of researchers and decision-makers and certainly outside standardised elaboration processes.

In the 1980s, marketing data was enriched by three large and innovative sources: socio-psychographic research based on sophisticated statistics, semiotic research and ethnographic research, especially focused on the cultural production of the groups examined. All of them based on 'statements', all of them genuinely enhanced by interpretation and none of them open and interested in integration with other data from other sources. On the contrary, proud of their single-source character.

Even in the field of data underlying various marketing activities, the advent of the Internet and the digitisation of consumption and consumers have played a role of epochal destruction and change. The technology supporting all new digital services and activities records in real time, with extreme precision and reliability, and with a wealth of spatio-temporal detail all the actions performed by all users. Actions that, in the space of three decades, have become so articulated and widespread as to encompass the entire repertoire of human actions. The entirety of digital behaviour is currently representative, if not a predominant part, of humanity, societies, social and market dynamics, consumers and consumption, everything that is relevant to marketing, etc. The digital world is, with a few exceptions, the most important part of the digital world. The digital is, with a few exceptions, an increasingly important element of the real world, and as such, unavoidable for marketing.

Marketing, which, moreover, has been blessed with a wealth of first-hand, first-quality data: those relating to the behaviour of almost all the groups it is interested in, with regard to almost all the dimensions it is required to address. Data that can be collected (and processed) in real time and expressed, in most cases, by the 'population', by the entire universe of analysed subjects, and not by more or less extensive and statistically representative samples.

The typological variety of data originating from and in digital channels has also expanded, especially towards more qualitative dimensions of social relations. With social networks in particular, so densely populated and intensively used by billions of people, previously submerged and inscrutable forms and phenomena of social interaction have been able to manifest themselves. The spheres in which they manifest themselves, not only favour their spontaneity and authenticity, but also allow for the use of analysis tools of great accuracy and rigour, among other things, capable of combining quantitative and qualitative contributions as never before possible in other times. The 'sentiment analysis' that is possible in social networks is one of the most emblematic examples. But more generally, it was this 'unstructured data', with all its innovative features, that gave new perspectives to the recent generation of marketing algorithms.

During the formation of this new landscape, more or less in 2012, people began to talk intensively about ‘Big Data’ (a definition that does not seem to have a single mother and meaning, but rather multiple ones, from the decade 1990-2000).

Regardless of its origins and original etymology, Big Data evolves and becomes a theory that, in addition to the volume of data, takes into account and values the variety, speed of generation and processing, and accuracy of the data available today.

A theory that quickly and extensively takes on the character of a new verb, but which also raises concerns about a possible, new ‘Big Data Hubris’, summarised by the authors of the alert as ‘as the implicit assumption that big data are a substitute for, rather than a supplement to, traditional data collection and analysis’.

There is no question, however, that the Big Data phenomenon let it be clear has a truly epoch-making depth and prospects, distinguishing itself in this from many other business fads or cleverly orchestrated campaigns. The variety of data that can be processed today, together with the power and intelligence of calculation, constitute, beyond all scepticism and prejudice, novelties that are as unprecedented (which have emerged in the last fifteen years) as they are harbingers of important evolutionary leaps in the use of data for understanding human, social and consumer behaviour.

As in statistics more generally, the descriptive and inferential possibilities of data in marketing are not only unprecedented, but also of some orders of magnitude superior to those before Big Data, despite the fact that, especially in inferential activities, no significant findings have yet been seen. In recent times, the use of two terms with different meanings has become widespread: ‘insights’ and ‘analytics’. Although pulled to either side in their everyday use, these two terms do not refer to specific types of data, but rather, in the case of ‘insights’, to a selection, a reworking of data in order to extract particularly significant information from it; to a particularly sophisticated type of analysis carried out on data of various kinds, in the case of ‘analytics’.

Gartner, a company specialising in the entire life cycle of marketing data, summarises the variety and hierarchy of importance of marketing data available today as follows: online purchases, customer data, market research, competitive intelligence, sales data, customer support, voice of customer, product reviews, metrics.

From our perspective, the significant presence of digital sources and that of qualitative types (reviews and customer voice and support) deserve to be highlighted. It should also be pointed out that the ‘competitive intelligence’ referred to is certainly not the traditional and more than